

JOURNAL OF THE
BOSTON SOCIETY
OF
CIVIL ENGINEERS

APRIL, 1930

Featuring

**Some Changes since Boston
was Settled Three Hundred
Years Ago**

**Fire Protection Engineering
as Applied to Municipal-
ities**

Annual Reports



Vol. XVII

No. 4

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SOME CHANGES SINCE BOSTON WAS SETTLED THREE HUNDRED YEARS AGO

PRESIDENTIAL ADDRESS BY FRANK E. WINSOR,* BOSTON SOCIETY OF CIVIL
ENGINEERS, MARCH 19, 1930

IN 1788 the writer's great-great-grandfather recorded a trip from New England to Ohio and return which required sixty-seven days, of which he "laid by 21 days" and traveled forty-six days, making a distance of 1,548 miles, or an average of nearly 34 miles per day. For travel in the saddle under the conditions of one hundred forty years ago this rate might seem fairly rapid to some of our horsemen of today. On another trip in 1792, eight days were required to reach Philadelphia, at which place he described some "curositities" seen along the Delaware River: "first was a steam boat which appeared to have been a very great cost and in my opinion would never answer any purpose; the second was a saw mill which went by horse or oxen. This appeared more like serving the purpose than the other."

It is of interest to note that an era of new inventions began about this time, before which there had been no material advances in transportation, communication or sanitation since the dawn of history. The first successful steamboat appeared some seventeen years later, and to one who had pushed the old-fashioned bucksaw to provide the fuel to keep from freezing during a New England winter it is no wonder that the contraption for sawing wood looked to be far more practical and useful than a contrivance to propel a boat by boiling water into steam.

Many today remember their doubts of the success of the phonograph,

* Chief Engineer, Metropolitan District Water Supply Commission, 24 School Street, Boston, Mass.

the radio, the airplane, etc., and there is no doubt that new inventions yet to come will excite the skepticism of future generations.

Comparable advances have been made in sanitation, medicine, surgery, etc., most of which have occurred during the past fifty years, and it is safe to predict that we are at the beginning of an era of more startling discoveries along these and other lines of inestimable value to the human race.

Among the greatest benefits which have come to humanity mainly during the past century are works for water supply and sewerage disposal, the former adequate alike for domestic use and fire protection, and the latter for removing liquid wastes to points where their disposal will be attended with a minimum of inconvenience or of danger to persons or property.

EARLY BOSTON

Although Boston celebrates its tercentenary this year, the water supply system is only about eighty years old, and the sewerage disposal works only slightly over fifty years old. In the early years Boston suffered severely from fire. In 1659 one hundred fifty buildings and several vessels were burned; in 1711 all the houses on Cornhill and many on State Street were destroyed; in 1760 three hundred fifty houses and stores were destroyed, and two other fires, which occurred respectively in 1787 and in 1794, destroyed one hundred ninety-six buildings, making a total of about one thousand buildings destroyed by fire in one hundred seventy years prior to 1800.

The population of Boston had grown to 8,000 in 1700, and to nearly 25,000 in 1800, at which time the entire State had a population of about 405,000. In 1800 there were ninety-seven streets and sixty-two lanes and alleys. The streets were generally narrow and winding, and were paved with stones, which were rough and uneven. There were eighty wharves, of which Long Wharf was 1,743 feet in length. There were three toll bridges (referred to in their time as magnificent) connecting Boston with the mainland, — Charles River bridge, built in 1785–86, 1,500 feet long and 43 feet wide; West Boston bridge, built in 1792–93, 3,480 feet long and 40 feet wide, with an almost equal length, crossing the marsh to Cambridge; and a bridge to South Boston, or Dorchester as this section was called in the early years. The houses in Boston in the year 1800 numbered about 2,500, chiefly of wood, with some brick, and quite generally three stories high. At this time Salem, with a population of 9,450, ranked next to Boston, with Newburyport third, with a population of 6,000.

DRAINS AND SEWERS

The first street drains were built some time before the year 1700. At a town meeting on September 22, 1701, it was ordered that "No person shall henceforth dig up the ground in any of the streets, lanes or highways of the town for the laying or repairing of any drain without the leave or approbation of two or more of the Selectmen." Such drains as were built became the property of the builders or contributors to the cost of construction, and as a rule followed the shortest and most economical route to the nearest water course, which was usually tidewater. The ownership and regulation of connections soon became so complicated that the Legislature in 1709 passed an act for the regulation of drains and common sewers, an act which gave the selectmen and the courts authority to adjudicate disputes as to connections, payments, etc. All the sewers and drains were in private ownership until 1823, when Boston obtained a city charter and took control of existing sewers and drains and subsequently built all new ones. Prior to 1823 all sewers and drains were built by private enterprise, with the object mainly of draining cellars and lands. Every house had a privy vault, the contents from which, and even the leakage from which, was excluded from the sewers. These sewers, however, received wastes from kitchen sinks, storm water, etc. Fecal matters were admitted to the sewers in 1833, with the provision, however, that the connections should admit fluids but should not pass solids.

In the early years the drainage of the city presented a very simple problem, the original hills sloping to tidewater so steeply as to furnish good velocities in the drains to the point of discharge, but as the tidal marshes and shallow waters adjacent thereto were filled, generally but slightly above tidewater, creating large flat areas through which the drains were extended, and with cellars frequently too low to be drained at high water, conditions became increasingly difficult. Tide gates were commonly adopted to prevent high tides from flooding the lower portion of the sewers.

BOSTON MAIN DRAINAGE SYSTEM

As these filled areas increased (the original area of the city north of Massachusetts Avenue being more than doubled) the nuisance became so serious that in March, 1875, the mayor of Boston appointed a commission of three, — two engineers and a doctor of medicine, — who reported in December of that year and recommended, in essence, what later became the Boston Main Drainage System and the Metropolitan

System of Sewers. The Boston Main Drainage System intercepts the old sewers above their outlets, and carries the sewage to a pumping station on the west side of Dorchester Bay, from which it is pumped through a rock tunnel passing under Dorchester Bay to a reservoir on Moon Island. The reservoir is designed to discharge at ebb tides. This system was finished about 1886, and, as is also the case with the subsequent Metropolitan systems, it was liberally designed to take care of sewerage contributions only from the area drained. As the original drains generally cared for combined sewage and storm water, outlets were provided, or rather the old outlets were commonly continued beyond the points of interception, so that storm flows are permitted to discharge through these outlets when the capacity of the interceptor is reached.

Before the Boston Main Drainage System was in operation, the necessity of further provision to relieve the water of Boston Harbor and vicinity from the ever increasing pollution of a rapidly growing population in the many surrounding cities and towns became evident.

MASSACHUSETTS DRAINAGE COMMISSION

The Massachusetts Drainage Commission appointed in 1884 reported to the Legislature of 1886 upon a general system of drainage for the Mystic, Blackstone and Charles Rivers, and included in the report suggestions for the sanitary protection of public water supplies of cities and towns located within the basins of these rivers. This report, together with a further investigation and report by the State Board of Health in 1889, laid the foundation for the Metropolitan Sewerage System, and also for a great part of the works of sanitation, which were subsequently built for the protection of the water supplies of metropolitan Boston.

METROPOLITAN SEWERAGE COMMISSION

A Metropolitan Sewerage Commission was established in 1889, with authority to build a system of intercepting sewers. Under this legislation a sewer connecting with the Boston Main Drainage System was built along the south side of the Charles River to Waltham (completed in about 1892), and the North Metropolitan System of Sewers, with an outlet off the east end of Deer Island and with various pumping stations, was completed in about 1895.

Legislation of 1895 provided for intercepting sewers in the Neponset valley, and legislation of 1899 provided for high-level sewers for the Charles and Neponset River Valleys. The sewerage of the Metropolitan

District is now discharged through three outlets, — namely, Moon Island, Deer Island and Nut Island. The disposal of the sewage of the Boston Metropolitan District by dilution in sea water has, on the whole, proved so satisfactory that it bids fair to continue. More and larger sewers will have to be built as the needs require, and it may be found best to extend the outlets to points farther distant from shore, but unless there should be some radical improvements in the art of sewerage disposal there seems to be little probability of any change in the method of disposal.

WATER WORKS

Water works in the modern sense were not installed until the Cochituate works were put in operation, in 1848, although a water works company was incorporated in May, 1652, and a private company supplied water from Jamaica Pond about one hundred and thirty years ago. About 1830 this company supplied some 1,500 houses through four lines of wooden pipes, two of 4-inch bore and two of 3-inch bore, and in 1840 laid the first cast-iron pipe in Boston. This pipe was 10 inches in diameter and about five miles long, extending from Jamaica Pond to Bowdoin Square. During the Civil War a water supply for Charlestown, Somerville, Chelsea and Everett was developed from Upper Mystic Lake, this supply being subsequently abandoned on account of pollution when metropolitan water became available in 1898. The Sudbury supply was developed by Boston in the period from 1873 to 1876.

METROPOLITAN WATER SUPPLY

In 1895, as a result of a comprehensive investigation by the State Board of Health, a metropolitan water supply was established, and in 1898 the works of collection, main aqueducts, the Chestnut Hill Reservoir of the city of Boston, and other works of less magnitude, were taken over by a state board for the purpose of supplying the Metropolitan District. This board augmented the supply by adding to it the waters of the Nashua River at Clinton, Massachusetts, where the Wachusett Reservoir was built. The Wachusett Works, with connecting aqueducts, etc., were practically finished about twenty-five years ago.

METROPOLITAN DISTRICT WATER SUPPLY COMMISSION

New work now under construction will bring water of the Ware River into the Wachusett Reservoir, and the supply will later be increased by water from the Swift River. The new works are being built

under the direction of the Metropolitan District Water Supply Commission. Upon completion these will be turned over to the Metropolitan District Commission for operation and maintenance, the commission which now has charge of Metropolitan Water, Sewers and Parks.

The metropolitan water supply is from surface sources, the greater part of the supply being stored in large reservoirs, both to increase the quantity available and to improve the quality of the supply. The water is not filtered, and its excellent quality is due mainly to the fact that the drainage areas are relatively free from pollution, and to the long period of storage. The new supply from the Ware and Swift Rivers is taken from sparsely populated drainage areas, and will also have the benefit of long storage. While the time may be expected to come when the metropolitan supply should be filtered, there is no immediate necessity to contemplate filtration, although provision for chlorination should be made.

Details of metropolitan water, sewers and parks will be found in a number of papers presented at the fall meeting of the American Society of Civil Engineers held in Boston in October, 1929, the report of which is published in the Proceedings of that Society for December, 1929.

FIRE PROTECTION ENGINEERING AS APPLIED TO MUNICIPALITIES

BY KENNETH F. AKERS*

(Presented before the Boston Society of Civil Engineers, January 22, 1930)

ABOUT a year ago, the city of Boston, through a committee appointed by the mayor, and under the direction of the Albert Russel Erskine Bureau of Harvard University, undertook the preparation of a report on the "Problem of Fire Waste and Insurance Rates in the City of Boston." For conducting the investigation, the Erskine Bureau, with Prof. Miller McClintock as director, obtained the co-operation of the Field Engineering Department of the National Fire Protection Association to serve as technical advisors, this work being handled by Mr. H. L. Bond of the latter organization.

It was my privilege to serve as associate engineer in the preparation of this report, and it seemed probable that civil engineers in general would be interested in a brief outline of some of the interesting and valuable information which this report discloses. Furthermore, I should like to show the many paths of investigation which are necessary before the real answer can be obtained as to why Boston's fire losses have been higher than necessary.

With the publication of this report, a few weeks ago, the city of Boston has assumed a unique position, in that it is the first American city, it is believed, ever to undertake a report of this nature. It is hoped that the value of this report to the city will serve to stimulate similar studies in other municipalities.

The success of the report depends largely on the public interest which can be aroused to the point of action. The Boston Society of Civil Engineers comprises a group of men whose widespread influence and support can do much towards obtaining the desired action.

It is not my intention to discuss that portion of the report which deals with the fire insurance rates as now in force in the city, except to say that the final major conclusion reached was that the quickest and surest way to reduce the cost of fire insurance is by reducing, and "keeping reduced," the fire losses. Spasmodic reductions are of little

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value, and steps must be taken permanently to keep Boston's fire losses at a minimum. The problem is therefore narrowed down to "how can this be accomplished."

BOSTON'S FIRE LOSS

That Boston's fire losses are really excessive can be seen by Fig. 1, which shows that Boston has a fire loss of approximately the same as

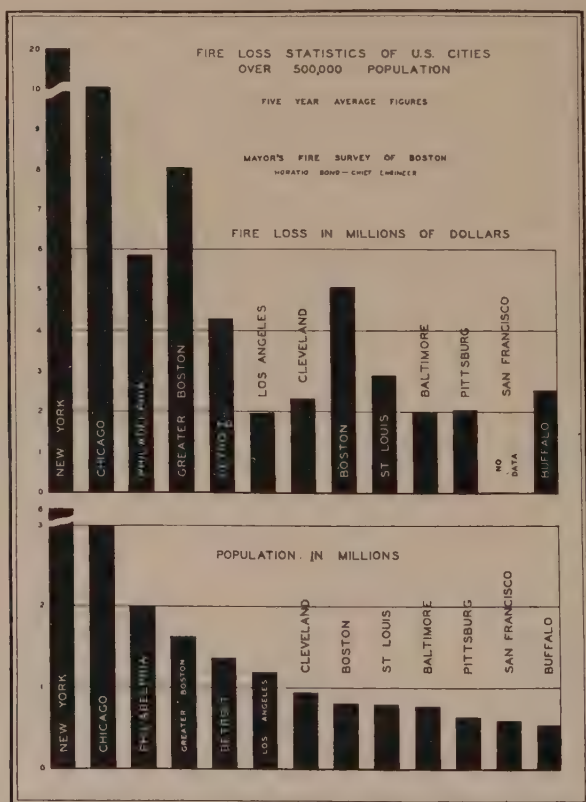


FIG. 1

Philadelphia or Detroit, both cities between two and three times as large as Boston, and it has over twice the fire loss of Baltimore, a city of about the same population.

Although apparently Boston's fire losses have been mounting, in reality Fig. 2 shows they have been fairly constant, considering the changing value of the dollar. In fact, the physical amounts burned have increased only \$21,000 in the thirty-year trend.

We then come to the question of "Why are Boston's fire losses so heavy?" The final conclusion, after months of investigation, was that there were some fifty reasons for this excessive annual loss. In a short space of time it is impossible for me to go into detail regarding all of these factors, but I would like to sum up the four fundamental reasons for Boston's fire loss. These are the following, which are not necessarily arranged in the order of importance: (1) poor building construction; (2) limitations of the personnel of the fire department; (3) ineffectiveness of the State Department of Public Safety; and (4) individual negligence by property owners.

If I should ask each of you individually your opinions as to why Boston's fire losses are high, I can well imagine that there would possi-

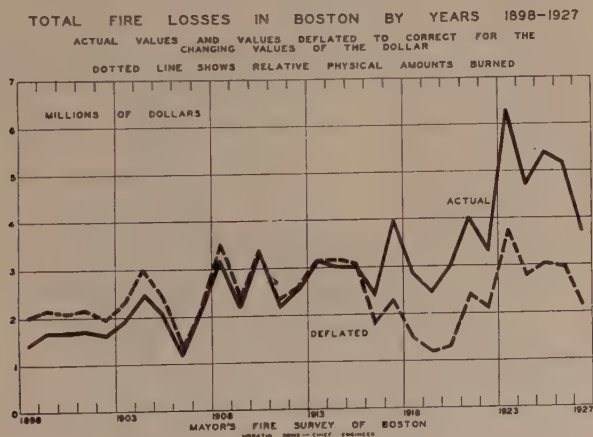


FIG. 2

ably be not more than two answers in ten that would agree. Moreover, in a measure, all of you would be partially correct. In other words, there is no *one* reason for fire losses, — it is a combination of many, and until the facts are known one could argue and get nowhere. The recent investigation has proposed to do just that thing, — collect and analyze the facts and prescribe the remedies.

BUILDING CONSTRUCTION

It is obvious that poor building construction cannot start a fire. This factor should, therefore, be classed only as a contributory cause for Boston's large losses. A detail study was made of all large loss fires over a period of five years; *i.e.*, all fires with a loss of \$15,000 or



FIG. 3

over. In most cases the details of these fires were poorly reported on the fire record sheets as compiled by the fire department officers, which fact I shall touch on later. Consequently, conferences were held with fire department officers who served at many of these fires. Their descriptions, plus the data on record, brought out the fact that in most cases the rapid spread of fire and the consequently large loss was due to the unprotected vertical openings through which the fire could rap-

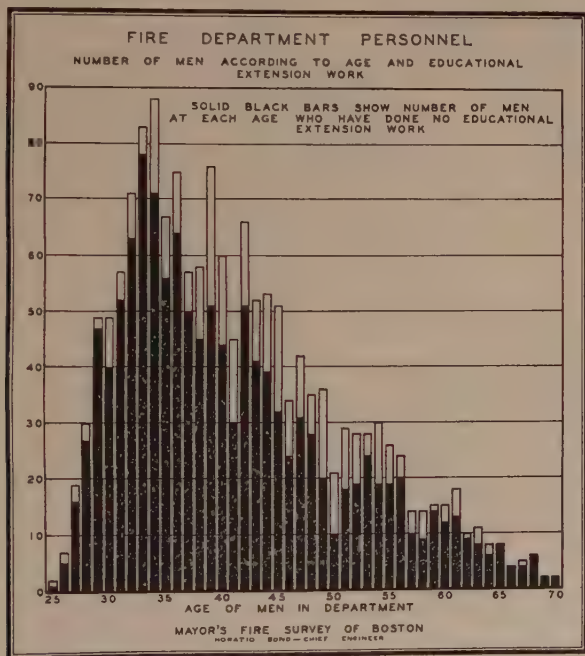


FIG. 4

idly spread unhindered from one floor to the next, to involve the whole building.

Boston is an old city, and it is natural that there should be many buildings of so called "obsolete construction." It is in such buildings that the large fires are occurring, and incidentally, these large loss fires represent over 50 per cent of the total fire loss in the city. It is necessary, therefore, that some steps should be taken to properly protect such properties from the danger of sweeping fires. Properly shutting off all open stair wells, open elevator shafts, and any other vertical openings between floors, will impede the rapid progress of a fire once

started. As an alternative, and to my mind far more effective, the installation of automatic sprinklers in this type of building will serve the purpose of counteracting the structural weaknesses. Automatic sprinklers are, without doubt, the most dependable and effective fire protection device known, and their more general use in the older buildings of Boston should be mandatory where such buildings, either by type of construction or occupancy, constitute a serious fire menace. In this connection, Fig. 3 indicates the number of fire-resistive or sprinklered buildings in "Boston Proper," or the high-valued district.

A sprinklered building, or a fire-resistive one, is an effective barrier to the spread of sweeping fires. The office district, as can be seen from Fig. 3, certainly serves this purpose. The light-colored areas to the north and south, however, are still inadequately protected against serious fires, and it is in these very areas that the obsolete construction predominates.

BUILDING CODE

The factor of building construction, and its close relation to the large loss fires, led to a study of the present Boston building code. It will be impossible to go into detail concerning all the findings of this study. In the main, the conclusions reached were as follows: the trend of building in Boston which has been sanctioned and crystallized by the building code is toward the construction of a large number of small three-story apartments of wood frame; apartments with brick walls and wooden interiors; mercantile buildings six to seven stories high, with very inadequate internal fire resistance, mostly in small units; and a few excellent fire-resistive buildings chiefly concentrated in the high-valued district.

What are the best means for providing a code which will stimulate the erection of a better type of construction? The following amendments, together with a recodification and modernizing of the code, should be sought:

1. Limit the height of frame buildings to two stories.
2. Increase the permissible area of combustible interior brick-walled buildings, but limit the height to three stories.
3. Recognize at least one, but preferably two, new types of incombustible construction for light occupancy buildings over three stories, these new types to be intermediate between the present so-called first-class and second-class buildings.

This latter recommendation is in keeping with modern developments in building construction, and is also in line with recent minimum

requirements for fire-resistive construction which are to be recommended by the Department of Commerce Building Code Committee in their contemplated publication on building codes.

BOSTON FIRE DEPARTMENT

The second major conclusion was that Boston's large fire loss was partly attributable to limitations of the personnel of the fire department. In all, the report suggests somewhat over thirty major and minor recommendations for improvements regarding matters of personnel, drills and training, salvage operations, response of apparatus, distribution of men, inspection work and arson investigation. Out of fairness to the members of the Boston fire department, it should be clearly stated that the results which they could obtain in fire prevention work and arson investigation are severely curtailed by the existing laws which bring about divided authority between the State Department of Public Safety and the city departments.

VALUE OF EDUCATIONAL WORK AND TECHNICAL TRAINING

Fig. 4 indicates the number of men in the Boston fire department according to age and amount of educational extension work pursued. The data for this study were obtained from a questionnaire issued by the Boston fire commissioner in February, 1928. There are several points of interest shown by Fig. 4. The average amount of educational extension work done by the members is exceptionally small, nearly 80 per cent of these men having made no further educational advances since entering the department, and considering the fact that 70 per cent of the department had only a grammar school education or less at the time of entrance to the department, it is still more significant. The business of extinguishing fires and preventing them is really a technical occupation. A fire officer must be able to distinguish between those types of building construction which will stand up well against fire attack and those that are easily weakened or may readily collapse. He should be somewhat of a chemist, and know how to handle fires in flammable liquids, pyroxylin plastics, and other chemicals subject to flash fires or explosions. Future officers must be selected from these ranks, and some means must be found to attract as high a caliber of man to the department as possible. This led to a study of the entrance and promotion requirements. Education alone does not necessarily need to be a criterion. Some means must be found to examine appli-



FIG. 7

cants for general intelligence and mental alertness regardless of education. There are many men who have been denied the opportunities of even a high school education, yet who are inherently bright men, and some means must be available to discover such qualities in applicants. The days of only a "water throwing" fire department are gone — the men must be able to use their heads as well as their hands in "fighting fires beforehand."

The matter of age is also of importance in studying the personnel of any fire department. In Boston's department, the lowest ranking officer is about fifty years of age. The average age of the whole department is about forty-five years. The educational work among the officers is slightly better than the average of the whole department, as shown in Fig. 4. Lowering the maximum age limit to twenty-five years instead of thirty-five, as at present, and making a high school education or its equivalent necessary in order to be admitted to the department would relieve these conditions. In addition, the physical requirements for promotion should be more stringent, and should be varying in accordance with the rank of officer, *i.e.*, a captain should be required to pass a more rigid examination than a district chief, since the former's duties are dependent upon far more physical ability than the latter.

A plan has been suggested which some may consider a radical move but which I believe would produce almost invaluable results. The lack of men with technical or engineering education can be taken care of by the establishment in the department of a technical division, headed by an experienced and technically trained fire protection engineer with a staff of at least five junior engineers. Their work should consist of (1) studying the records and reports of all fires and fire alarms in order to obtain valuable experience from the records of such past fires; (2) studying the introduction of new hazards in various parts of the city and methods for their control; (3) preparation of spot maps of fires throughout the city, and the laying out and supervising of new inspection districts from time to time; (4) instructing officers and men on all new developments in the field of fire protection and fire fighting methods; and (5) generally serving as a board of technical advisors to the commissioner and assisting him in obtaining improvements in all department work, particularly in the fire prevention phase.

Figs. 5, 6 and 7 may serve to illustrate some of the studies which this technical division should be constantly preparing.



FIG. 8

PARTICULAR FIRE AREAS

The heavy concentration of fires, and hence the areas where specific attention must be directed, can be clearly seen in Fig. 5. The West and South Ends show up poorly, as do sections of Dorchester.

Fig. 6 is significant in that what are small loss fires one year may be large loss ones at some future date. Previous to 1926 the large loss fires (fires of over \$15,000) averaged about 60 per cent of the annual total losses. Since 1926 such fires have accounted for only about 46 per cent of the total losses. In other words, the fire department is now making "small fires" out of what were previously "big ones." I firmly believe that the good work of Mr. Hultman (who I am pleased to say is here tonight) in improving the morale and fire-fighting methods in

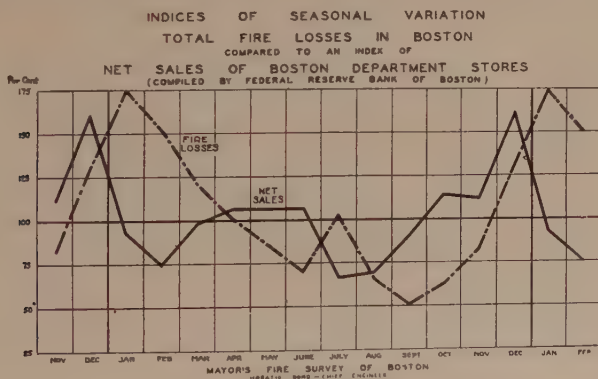


FIG. 9

the fire department has been the largest factor in bringing about such an improvement. Fig. 6 could well serve as a basis for inspection work, with special effort from every source to clean up the obviously "bad areas."

Fig. 8, showing blocks recommended for inspection, was prepared by studying the location of all fires as previously shown. Such blocks might change from year to year, and it should be the duty of the technical staff, as recommended, to keep the records up to date so that systematic intensive inspections could be made. Too often the work of fire prevention is looked upon as a hopeless task in a large city. The work is often so scattered as to be of little value. A few of these studies have been presented to show that with systematic planning the task is by no means beyond human control.

STATE DEPARTMENT OF PUBLIC SAFETY

The third major cause for Boston's fire loss record was attributed to ineffectiveness of the State Department of Public Safety.

In studying the attempts of the Boston fire department to control fire hazards, it was found that their efforts to "fight fires beforehand" (as has been aptly expressed by another fire protection engineer) was closely interwoven with State activities. It soon became apparent that the ineffectiveness of such divided authority was impeding the progress of this work. A study was, therefore, made of all State laws relative to fire prevention and of the administration of the State Department of Public Safety, particularly in reference to the extent to which the State was able to control the fire waste problem. In this connection it was

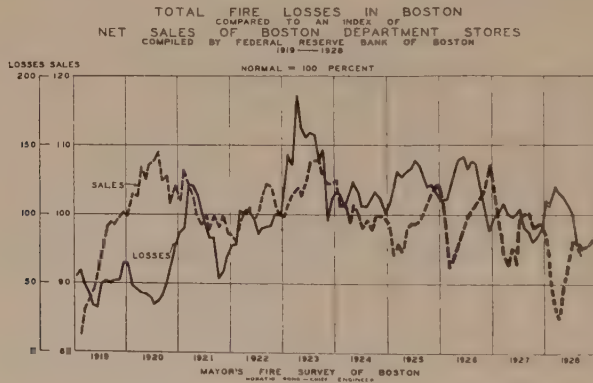


FIG. 10

found that the fire waste throughout the State as a whole averaged proportionally more than the fire loss in the city of Boston. It would seem evident that the same factors which were at work in Boston were also at work throughout the State. The main trouble seems to lie in a lack of adequate rules and regulations which can serve as a guide to individuals in properly caring for fire hazards, plus a division of authority between State and city officials which has led to general ineffectiveness not only in Boston but throughout the State. Codification rather than any change in fundamental intent is required to make present fire prevention legislation yield the results for which it was designed. The differences between the laws applying to Boston and those applying to other cities in the State cause much confusion and appear illogical.

Modern industry has introduced many fire hazards into a city as

large as Boston. Fire prevention rules and regulations, however, have been developed which if followed assure reasonable fire safety from such hazards. In order to determine to what extent typical hazards were covered by either State or city ordinances, a study was made of the 46 sets of rules and regulations which should be in force for controlling 46 typical hazards. Of these, 6 were deemed adequate, 11 fair, 16 poor and 13 were missing entirely.



FIG. 11

The final conclusions reached were that a revision of chapter 148, General Laws, relative to fire prevention, was imperative; that adequate regulations were badly needed for the proper control of all fire hazards throughout the State; and that the arson laws now in force be revised and brought into conformity with the Model Arson Law now adopted in many other States.

RELATION OF FIRES TO BUSINESS CONDITIONS

As one evidence of the fourth major cause of Boston's fire losses, Figs. 9 and 10 are a very interesting study of the effect of business conditions of fire losses, and will help to show why gross negligence of individual owners is cited as one major cause, as well as substantiating to some extent the recent claim that "Arson is a business in Boston." Not only can it be seen that whenever business is poor fire losses are greatest, but even the slight varying of business conditions causes corresponding fluctuations in fire losses.

There were many studies made during the course of this investigation which were prompted by the fact that many of Boston's fire problems are closely tied up with the fire loss situation of the cities and towns comprising the Greater Boston area.

Fig. 11 indicates the location of typical conflagration areas in Greater Boston. These areas were located after much study of conditions in the field, and represent sections in which a sweeping fire is easily possible, due to poor construction and congestion, or to the presence of a "conflagration breeder" in the vicinity.

MUTUAL AID SYSTEM

In connection with this study it was pointed out that in event of serious fires, concentration of apparatus would be needed, and considerable areas left unprotected at such times unless some adequate mutual aid system existed between the fire-fighting forces of Greater Boston. It was suggested that a State commission be appointed to study the needs of a mutual aid system between the fire departments of Boston and surrounding municipalities, to the end that a quicker and heavier response to alarms might reduce the number of large loss fires as well as minimizing the dangers of a bad conflagration. Incidentally, the experience in the Boston fire department has proven, during the last few years, that such heavier and quicker response to all fires has materially reduced the number of large loss fires.

I hope that I have in a measure indicated the wide scope of this recent fire protection engineering investigation. There is every reason to believe that with intelligent application of the many suggested improvements indicated by this report, Boston can take her place among those desirable cities in which the cost of living and doing business is not burdened by unnecessary fire waste.

In closing I would like to quote a few words from America's foremost engineer, regarding conditions in the United States:

Our annual fire waste of several hundred million dollars is capable of great reduction at a total cost to the community low in relation to the benefits secured. The problem resolves itself largely into the individual problems of local communities throughout the country, and the co-operation of all different elements in the community is required for best results.

These are the words of President Hoover.

Discussion

DR. MILLER MCCLINTOCK:* It is a privilege for me to be here this evening and to have heard Mr. Akers' admirable paper on this recent study, and to speak briefly concerning it.

Mr. Akers mentioned that I was director of the survey, and so I was, but that fact is not as significant as one might imagine. If I deserve any credit for the report and the theories behind it, it is because I had sense enough to select good men to do the job. To Mr. Akers as associate engineer on the technical staff, and to Mr. Bond of the National Fire Protection Association, who was chief engineer, much of the credit is due. Likewise no small part of the credit is due to Commissioner Hultman and to the other officials who have given such cordial assistance.

This survey, although originating from a consideration of insurance rates, developed into a study of the far more important matter of the causes of fires and losses, which is really the basis of fire rates. This was the aim which was finally agreed upon in the conference at Mayor Nichols' office, and there was inaugurated an investigation of considerable importance and significance of the type of engineering activity particularly applicable to municipal administration.

No development in the social organization has been so phenomenal as the development of the American city during the past half century. It has grown in size and complexity, and one problem after another has confronted the city in a very critical sort of way. How shall these problems be handled, — fire prevention, police protection, the development of airports, and street traffic? One is the political way, in which, patronage and the advantage of a particular group may be the uppermost consideration.

* Director, Albert Russel Erskine Bureau of Harvard University.

The other method of approaching a problem of municipal administration is to combine with the political a sound technical knowledge. To demonstrate that there can be combined with sound good politics sound technical activities and sound common-sense methods, using facts and knowledge rather than guesswork in dealing with these problems, has been one object of our survey.

I submit to you and to the whole engineering profession that it is our duty to help public officials with the technical information that we have, in order that they may know how to do the right thing.

EUGENE C. HULTMAN: * I shall not touch on the report particularly, except to say that I have ordered 300 copies of this report to be distributed among the officers and members of the Boston fire department, with the intention of having them read and study it. So far as I know I am the first engineer who has ever been fire commissioner. Anyway, I am the first engineer to act as fire commissioner of the city of Boston.

When I first assumed office as fire commissioner, Mr. Bond, who was later connected with this survey, showed me what the fire loss in Boston amounted to at that time. Expressed on the per capita basis, it was about \$7 for every man, woman and child in Boston. The insurance companies claim they cannot do business profitably if they have to pay more than 50 per cent of the premiums in losses. As there was nothing to indicate that these companies were not profitable, the cost for insurance and the fire losses amounted to about \$14 per capita. The Boston fire department was costing about \$6 per year per capita. Consequently there was a total bill of \$20 for every man, woman and child for fire waste, which is equivalent for every family of five in Boston to \$100 a year for fire loss, a great economic waste. This \$100 per family did not include loss due to unemployment, disruption of business and other economic features. It seemed to me that this \$100 brought an extremely small return to the community. I became interested to see what could be done to reduce this amount.

In considering further this matter of fire loss, it is interesting to note that I have on my desk every day a card showing each individual fire, the name of the owner of the building, the names of the tenants and various other information. I looked over the cards and even with my large acquaintance I couldn't find one in a hundred whom I knew who had suffered a fire loss. I inquired from the National Fire Protection Association, the Chamber of Commerce and others, and asked many of these men how much they had paid in insurance and how much they

* Fire Commissioner, city of Boston.

had collected on it. These were reputable men of the city, and in no case was it found that the amount they collected, compared with the amount they had paid in insurance, had ever been over 10 per cent. That suggested the thought — who gets the rest of it?

I have been accused of being critical of the State Fire Marshal's organization, which is the only organization in this Commonwealth which chases arson. The whole city of Boston is covered by only three or four inspectors from that office. In this city there is a police department of 2,300 men and a fire department of 1,700 men; but they are eliminated from such inspection because of the wording of the statute.

Of great importance is the public's duty to know about the fire department, fire alarm boxes and other matters for its safety. What do you know about your own fire department? It has had its political vicissitudes. The Boston fire department annually costs about \$4,500,000. We have 53 engine companies, 31 ladder companies, over \$1,000,000 invested in fire boats, and shops where we are rebuilding or building apparatus. The public knows very little about it, and seems to take little interest in it. Yet it is the only agency maintained to preserve their life and property from fire waste. Inexperienced men have been made fire commissioners and changed every few years; yet the law says that the fire commissioner in Boston is charged with the saving of life and property and the extinguishing of fires.

I am of the opinion that this is an engineering problem — in fact, running a fire department is an engineering problem. Yet very little provision is made to educate the men along technical lines. I am not criticizing the Boston fire department, because the men there are as good as any. They take their work seriously and never consider their own lives when there is a question of saving the lives and property of others. But what is being done to educate or to protect them? When I became fire commissioner there were not even gas masks, which were necessary for them, and fires were being fought in the dark. Men went into smoke-charged buildings, and when they stepped from one room to the next they didn't know but what they were going to step in a hole, and perhaps go down the elevator shaft. No consideration was shown them. But they persevered.

These men want to learn, and they sacrifice their life and health. I hope that this report will at least cause Boston to give the men the opportunity they deserve. The men in my department are proud they have reduced the loss in Boston \$1,500,000 within the last year. There is no reason, if they are properly supported, why they can't reduce it more.

The truth about our poor construction is all very interesting, but in London and Paris, where the buildings are old, it must be realized that their fire loss is about 50 cents per capita per year. As to alleged fireproof buildings, it sometimes seems to me that every generation builds fireproof buildings and the next burns them down. The manufactured products of today are so inflammable that fire will destroy anything.

Sprinklers are a great help, but they do not prevent arson. We have had two or three serious losses in sprinkler-equipped buildings. In every case the sprinkler system was shut off before they touched it off. Nothing has happened to the owners, and they collected the insurance. I hope this report will at least interest engineers enough to encourage them to give some support to the Boston fire department.

MR. PERCY BUGBEE: * Mr. Akers told you that this report was the first study of its kind ever to be conducted in any American city, and I believe that the few remarks I have to make to you tonight would be of most value if they gave a little illustration of the results of fire protection effort in some other cities throughout the United States.

The National Fire Protection Association is thirty-four years old. During the first twenty-nine years of its existence it was largely a technical body. It developed standards for fire protection, studied the history of fires, and undertook to give out information on such subjects. Five and a half years ago it started the experiment of trying to interest city officials and local citizens in the idea of reducing their particular losses in a practical way, on the theory that while the fire loss of the Nation was an economic waste, and to be deplored, the only way to obviate it was to get each individual community to do something about its own particular fire problem. In the past five and a half years I have visited about 150 American cities and talked with officials and others about their local fire waste problem.

The first city to come to our attention because of its heavy fire loss was Norfolk, Virginia. The loss there during the previous eight years — from 1924 — had averaged \$8.50 per capita, more than twice the average of the other cities of the country. We descended on Norfolk. Included in our party, besides Mr. Wentworth, our managing director and myself, were the chief engineer of the National Board of Fire Underwriters, the chief engineer of the Southeastern Underwriters Association, a representative of the United States Chamber of Commerce and others. We had meetings every day for a week; talked to the city manager, talked to the Chamber of Commerce, etc. The

* Assistant Managing Director of the National Fire Protection Association.

Chamber had just raised \$100,000 to boost Norfolk and try to get new industries to locate there, and we said, "What's the use of getting new industries if they are going to be burned down as soon as they get here? Besides, they will have to pay a very excessive fire insurance rate." We succeeded in getting a committee appointed consisting of the presidents of the various civic organizations of the city. We developed a program that would take some years to carry out and a lot of money and effort. They set seriously to work, and the first year, after they had determined upon the problem, they created a comprehensive inspection system in the fire department and improved the water pressure. They worked out a new building code, and have since done many other things along the line of those mentioned in this Boston report. The first year their fire loss dropped to \$3.04; the next it dropped to \$2.52; the next year to \$1.79; the next to \$1.93; the next to \$1.79. Those figures were in comparison with \$8.50 for the previous eight-year period.

Take another example, — Detroit, Michigan, — where there is a very active and influential fire-protection committee, representative of the official and commercial life of that city. The committee meet once a month the year round, and have done so for years. They have devoted a lot of intelligent study to the fire waste problem. Their loss is remarkably low in comparison with that of other large cities in the country. They have had only one really large fire in several years, — the Briggs Body fire in 1927. The cause was a violation of the spray booth installation rules of the National Fire Protection Association.

Another city that comes to mind — another convincing example of the practical profits to be derived — is Kansas City, Missouri. There the fire record had been bad for years, and we could make no headway with the administration. We sent a bulletin to the Associated Press and to about 100 newspapers throughout the country, describing the situation in Kansas City, and stating that "You are paying for the bad record of this city." This paper carried editorial comments, and the "Kansas City Star" began to get exchange notices which served to awaken public opinion. The result was that the following year a bond issue of over a million dollars was passed for improvements in their fire protection. It was the only one out of twenty-seven measures which did pass. Their fire loss has been very materially reduced since then. During the past two years it has been the lowest in many years.

These are just illustrations of what can be done when a community is aroused to adopt measures to minimize fire waste. That is what is before you in Boston, and we are glad that this pioneer effort is being made in Boston because it is the headquarters of our Association, and

it seems fitting that this should be the first city to tackle the problem in a complete and sound way.

MR. I. OSGOOD: * I suppose the only reason I am asked to speak to you is because I represent the "goat"; in other words, the organization which makes the fire insurance rates in the city and which represents the fire insurance companies. I confess that when Mayor Nichols first proposed an investigation of fire insurance rates we were somewhat disturbed, because we did not know the direction the investigation might take, but when we found that it was to be organized on an engineering basis, and was to be directed by Dr. McClintock, we felt very glad, indeed, to know that the study was to be made, because we were perfectly sure that it would develop sufficient grounds for reasonably high rates in the city of Boston under the present conditions. We have been privileged to follow the study as directed by Dr. McClintock, and are very proud, indeed, of the result of his labor and of the report of the engineers who actually did the work. Nobody is more interested in the reduction of the fire loss than the fire insurance companies themselves. We are constantly doing as careful inspection work throughout the city as we can, and the principal idea back of that inspection work is to keep the fire loss down. The matter of rate making is more or less secondary. The question of reducing the fire loss is stated in our constitution as the primary object of our existence. I sincerely hope these distinguished engineers will read this report very carefully, absorb it, and I am sure that the results will be gratifying.

MR. HENRY A. FISKE: † For many years I have felt that a thorough investigation of fire losses should be made. It is gratifying to see a report as extensive as this one here in Boston. Although it is so exhaustive, that fact should not prevent a great deal being accomplished as a result of this study, because an attempt has been made to cover the subject in a more thorough manner than has ever before been accomplished.

The total fire loss in a city is made up largely of a relatively few large losses, although there is a large loss occasioned by a great number of small losses. A big part of the problem is to prevent those fires causing large individual losses. These fires are possible because of the construction or occupancy conditions. The community must therefore give attention to these conditions and correct them before fires have the opportunity to cause great damage. That is essentially an engineering problem. Immense sums are spent for fire departments, but little for fire prevention.

* Engineer, Boston Board of Fire Underwriters.

† Grinnell Company, 275 West Exchange Street, Providence, Rhode Island.

It may be interesting to note that in Providence there has existed for a number of years a fire prevention bureau which makes inspections of industrial buildings, and is now undertaking inspections of dwellings.

I have been interested to watch the progress of the work of the National Fire Protection Association in its field of service, accomplishing a great deal of good throughout the country, and this report is the outcome of the work it started.

MR. FRANK BRADFORD: * Most of the former speakers have spoken of this fire situation as an engineering proposition. That is something I think very few engineers actually realize. Yet the only contact the ordinary engineer or architect thinks he has with the fire problem is the construction of buildings in accordance with the building code — putting into their structures the minimum that is required in the building code. They do not, as a rule, voluntarily design and build their structures for real fire resistance. The property owner — the man who engages the engineer and the architect — tells them to build for him a building of a certain height and area to house certain goods or processes, but he very seldom directs that they build it for the maximum of fire resistance. Occasionally he says, "I want to get a fairly good insurance rate," but that is usually as far as his instructions go. The architect then turns to the building code and sees what he can get away with in order to make the building cost as little as possible.

The cost limitation is, of course, beyond your control. At the same time, the engineer who has studied fire protection can build into the structure, if he wants to, the design and materials that will make that structure a reasonably fire-safe building, without in any way increasing its cost above the cost that has been estimated for an ordinary building.

The result of this is to restrict the national fire waste, which now amounts to about \$500,000,000 annually, to have helped prevent the loss of some 18,000 lives by fire, and to have helped reduce the cost of insurance and conserve the taxable property of the community. Obviously, all these things are well worth while, but to accomplish these objects there is required an engineering knowledge of fires and their habits.

At first thought there isn't much the individual can do in the way of reducing fire loss because the thing is so tremendous. It was my good fortune to participate in the preliminary discussions of the mayor's fire waste committee, and I think I helped a little in directing their

* Director of Safety and Fire Protection, Boston & Maine Railroad.

lines of thought to the ultimate result that this survey was undertaken, which indicates that the individual can do something.

The Boston & Maine Railroad properties are spread over some 2,500 miles, covering all northern New England. This includes some hundred million dollars worth of destructible property. There have been in the past and there still are plenty of fire losses, but the losses in the last four years have been reduced by approximately 75 per cent by the application of a little bit of ordinary engineering knowledge and ability.

MR. H. O. LACOUNT:* I have been interested in this paper by Mr. Akers, and also in the comments of the Commissioner, who asked the pertinent question as to what we know about the Boston fire department. From my office near the fire station in Fort Hill Square I frequently see the apparatus responding to the alarms. There are many fires in Boston, and a study of their causes is important.

Building construction is an important factor, and I doubt if there is any fireproof construction, but I believe there is fire-resistive construction as referred to by the last speaker, the beginning of which is in the drafting room, where the plans may be made for protection, particularly of vertical openings. For buildings in use the proper care of waste and rubbish is important.

Sometime ago, during a course of lectures given at Harvard University, I asked the students for recommendations for the improvement of fire conditions, and one reply stated that buildings should be designed to permit the fire department to "percolate" through them. But, many buildings are now built so that the fire does that very thing.

With respect to arson, I believe that serious punishment should be meted out to owners who are responsible for such procedure.

Sprinklers also are a great factor in tending to reduce the fire losses, particularly in cases of inferior construction and other hazardous conditions. I believe that more use could be made of these systems by connecting a pumping engine to them in times of fire, to insure a better supply to the sprinkler heads.

Inspections by the fire department, if made regularly and at frequent intervals, particularly in bad areas, should reveal many of the causes of fires and bring to light conditions that should be remedied.

MR. FREDERIC H. FAY:† I would like to inquire as to what extent and in what manner inspections of properties, just referred to by the

* Consulting Engineer, Inspection Department, Associated Factory Mutual Fire Insurance Company, Boston.

† Consulting Engineer, Fay, Spofford & Thorndike, 44 School Street, Boston, Mass.

last speaker, are being made here in Boston by the Boston fire department. I think that would be of interest to the meeting.

MR. EUGENE C. HULTMAN: The fire department has a Fire Prevention Bureau with twenty-five inspectors, which makes between two hundred and three hundred thousand inspections a year. The city is divided into fifteen fire districts, and all the inspectors are placed in one district at a time, but these inspectors have no police power. Shortly after I started this more or less elaborate inspection service we had an epidemic of incendiary fires in the West End, and the Fire Prevention Bureau got very excited about it. So I ordered the inspectors into that district and told them to stay there at least a week and inspect everything fore and aft. Almost instantly that epidemic of incendiary fires stopped. I then moved that squad out to Roxbury, — a prolific place for fires, which receives a good deal of our attention. The mere fact that men in uniform were going through the buildings seemed to have a beneficial effect.

It is interesting to note that when first we started this thing, and began taking people into court who didn't obey our orders, the judges didn't do anything about it. But we kept on, until today I believe in the last year we haven't lost a case which we have taken into court, and that has had a very considerable effect in cleaning things up. It doesn't seem to reduce the number of fires, though. Unfortunately the commissioner has no power to correct defective heating apparatus, defective flues, etc., but, owing to the fact that the late building commissioner was also an engineer, we had good co-operation. My inspectors reported to me and I reported to him any defective chimneys, and a good many such defects were remedied.

MR. WILLIAM A. BRYANT:* It may be of interest to mention that in Brookline three or four years ago an inspection service was organized, which covered stores principally, and it was found that after inspection had been enforced, there were only two store fires out of some 500 alarms per year.

MR. AKERS: In connection with inspections, I was greatly surprised in studying the type of buildings where losses occurred (this was only one year's study and might not hold for other years), but in 1927 one-third of the total fire loss in Boston was in residential buildings. The popular conception is that "big loss" fires occur in the congested districts, which in the main is true; but when you consider that one-third of the total loss is in dwellings, you begin to realize the hazard of dwelling houses. Certainly, however, such hazards should not be

* Civil Engineer with Henry F. Bryant & Son, Washington Street, Brookline, Mass.

comparable with the fire hazards in factories or mercantile buildings. There are many residential buildings in Boston, so we naturally would expect that there might be a large proportion (one-third) of the total fire loss in the city attributable to that type of building. The significant fact is that of this one-third, practically 80 per cent occurred in apartments of more than one family. It is rather difficult legally to inspect a private house where the safety or welfare of only one family is concerned, unless you play on the fact that the property may be a hazard to its neighbors. Eighty per cent of these losses were in buildings housing three or more families, and such buildings are legally capable of inspection. The fire commissioner can at least inspect basements and hallways of such residences. Many of the big losses in residential buildings were attributable to building construction. In many instances the fire started in the basement, and when the department arrived it was burning through the roof. This means that it spread upward through unprotected vertical openings. My idea is that special attention should be given to the inspection of dwellings containing three families, or over, because such dwellings or apartments contribute most to the fire loss.

MR. JOHN F. PIERCE:* As one of the city managers of the country I have been interested in trying to connect this work in the fire department with that in the other departments. It is difficult to get money for any preventive measure, whether it is in the schools for protection of the children's health by inoculation, dentistry, or something of that sort, or whether it is for the prevention of fires.

One community I have in mind suffered loss of life because the members of the fire department did not know how to use gas masks, a condition which was later remedied only because publicity of such conditions forced the passage of sufficient appropriation to provide for instruction.

MR. AKERS: This may not help any to cure the situation, but I suggest that if it could be put up to a committee, the door could be opened, and a large sum of money appropriated for the prevention of fires, which could better be spent in this way than wasted in fire loss. It seems logical that if Mr. Bugbee could pry a lot of money from Kansas City for this purpose, it could be done elsewhere with well-directed effort.

* Former city manager of Springdale, Pa.

OF GENERAL INTEREST

A BETTER JOURNAL

By Edward H. Cameron

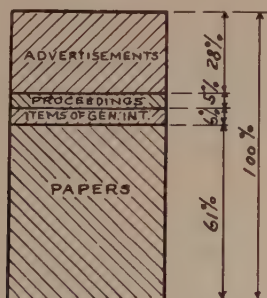
Here is a society of some thousand members represented by a two-dimensional publication as emaciated as a Wall Street Bull in October. We call for the respect of engineers in other sections because of our age. Were they to judge the Boston Society by its JOURNALS they might be pardoned for substituting the term "senility." We refer to quantity; the quality is not criticized.

Let's argue from the premise that this Society rates a first-class publication. Examine the evidence submitted as proof that it does not qualify:

Exhibit A. — Only one paper per month.

Exhibit B. — Two to three brief items of general interest per month.

Exhibit C



MONTHLY AVERAGE PRECIPITATION
(Average of January, February, March, 1930)

Exhibit D. — Quantitative Analysis

Item	DESCRIPTION	Per-centage	Quality	Remarks
1	Papers	61	Excellent .	Good reading.
2	Items of general interest	6	Excellent .	Entirely too few of them.
3	Proceedings	5	Historical .	Moisture content zero.
4	Advertising	28	Above reproach	Necessary, appreciated, disproportionate in volume.
		100		

Exhibit E. — Standard Specification for the Ideal Journal

1. Good make-up, pleasing typography in print and cuts.

2. Valuable technical contributions in the form of papers and items of general interest.

3. Communications relative to the conduct of the society.

4. Complete historical record of meetings, membership, etc.

5. Advertisements.

6. Properly functioning personnel:

(a) *Contributor* — who supplies copy to —

(b) *Editor* — who edits and presents it to —

(c) *Reader*.

An analysis of the evidence leads to a conclusion which is instantaneous, obvious and convincing. No fair jury could fail to return a verdict of *guilty*.

"A" and "B" point to a deplorable condition.

"C" at least inspires respect and thanks for one feature; God bless our faithful advertisers.

"D" speaks for itself.

"E." The cover, type and cuts of the JOURNAL are admirable. The technical value of contributions is high. There are no communications relative to the conduct of the Society. We have already paid our respects to the advertising section. The proceedings give records that have historical value.

The "Personnel" item must be examined in detail. We suspect that this item contains the dynamite. Our Editor, it will be noted, is sandwiched between a dual personality, the contributor-reader, for we have no literary staff other than our Editor. You and I must write that we may read.

Our present Editor and his predecessors have wept salt tears, inveigled, threatened and cajoled the contributor

person for copy, that the latter in his later stage as reader might have matter to peruse.

But the chrysalis has been too tough. A blend of the legal-politico strain is to be desired in engineers. Next to verbal, public articulation, appearance in print is our *bête noire*.

Actually, a good case can be made out for a suspension of this reticence in print through an appeal to purely selfish emotions, leaving out that of loyalty. One distinguished engineer once told the writer that he should publish something every year because it crystallized the author's knowledge of the subject, and that, in the opinion of the engineer referred to, technical writing was an essential element in an individual's engineering progress. Robins Fleming is prolific in technical writings that are of value to all steel designers. In an article, "Why Write" ("Engineering and Contracting," February, 1930), he pays his respects to technical writing as an instrument of value to the writer, and answers the question "Why Write?" by "Write for Yourself." You will soon realize that the effort expended in shaping your ideas to fit publication will pay big dividends in enlarged and deeper knowledge of the subject.

Above all, rout that reticence, modesty, inferiority complex, or whatever it is, and send the Editor copy. Make it anonymous, if necessary (enclosing name and address for reference in case of suit), but write: a paper, an article of interest, a communication to the Board of Government — anything from the broad store of your own personal experience that will interest the rest of us.

The writer has not had the pleasure of meeting Mr. Grossman, whose name has been conspicuous in its isolation in recent JOURNALS, but wishes to congratulate him on the quality and variety of his writing. A national engineering

journal recently thought highly enough of one of Mr. Grossman's contributions to our JOURNAL to quote it at length. We should have more young men of his spirit as contributors.

Summarizing

The JOURNAL is too thin.

It's the contributors' fault, yours and mine.

It's worth while.

Loyalty demands that we write, that the JOURNAL may properly represent Boston engineering thought and be a credit to the Boston Society of Civil Engineers.

Uniform Building Code Suggested for New England Communities

A new code of building laws for all New England States may be the outcome of the co-ordinated activity of the New England Building Officials' conference and Building Commissioner Eugene C. Hultman of Boston, under whose supervision existing municipal building laws are being revised and codified.

Forty-six committees are working under the direction of ten general committees, and of an advisory committee composed of recognized professors of architecture, leading architects and engineers, upon whom will rest the final decision upon any new code of regulations which may be recommended.

Boston is vitally interested, and to make certain that adequate financial support may be available, it is understood that the city of Boston has set aside a fund of \$10,000 and has provided permanent quarters for the various committees in City Hall annex.

Boston does not propose to be placed

at any disadvantage which may impair new building construction projects because of the enforcement of a more strict building code than will be in effect in near-by cities. It is expected that the study which is now in progress will result in the adoption of a uniform code in every municipality in New England.

The New England Building Officials' conference, of which Edward W. Roemer, supervisor of construction in the Boston building department is president, is the successor of the Massachusetts Building Officials' conference which was organized in 1913 to encourage more efficient and uniform administration of building laws, to advocate the passage of proper laws, and to educate the people to the importance of the duties of municipal building officials.

In 1929 the Massachusetts organization was expanded to embrace all of New England, and regional committees were formed in Boston, Worcester, Providence and Hartford, and empowered to prepare a uniform building code.

The Boston building department has become affiliated with the New England organization, and instead of confining revision and codification of existing Boston laws to the city, the scheme has been expanded so that the new purpose is to strive to co-ordinate all New England codes into uniform regulations.

MEMOIRS

John Richard Rablin *

DIED SEPTEMBER 17, 1928

John Richard Rablin was born in Plymouth, England, on October 25, 1868, the son of William H. and Mary Edwards Rablin. He came to the United States with his parents when he was about three years of age.

* Memoir prepared by Lewis E. Moore.

He was graduated from the Boston Latin School, Boston, Mass., and entered Harvard College, but the death of his mother, which caused the removal of the family to Maine, ended his college education.

Mr. Rablin began his engineering work in 1888 as an engineering assistant on the Old Colony Railroad, under the late B. T. Wheeler. His professional education was obtained under Mr. Wheeler's tutelage and by studying nights by himself while he was working during the day. When Mr. Wheeler went to the city of Boston as superintendent of streets in 1895, Mr. Rablin went with him, remaining there until some time in 1896, when he became associated with the contracting firm of Horton & Hemenway, as contractor's engineer. This firm had contracts in connection with the construction of the South Terminal and Back Bay stations. The principal work on which Mr. Rablin was engaged was the construction of the Back Bay Station.

His work with the Metropolitan Park Commission commenced in 1899, when he was made assistant engineer in charge of construction of the Charles River Speedway. In 1904 he was appointed chief engineer of the Commission, a position which he retained until his death.

There was a tremendous expansion in the amount and kind of work done in the metropolitan park system after Mr. Rablin assumed the position of chief engineer. The work was not only construction and maintenance of parks, but also the construction of many important boulevards and their later improvement to enable them to carry heavy automobile traffic, as well as the construction of a number of bridges in the district. The great diversity of his work would be better understood, perhaps, if it were mentioned that he also had charge of

shore protection and the construction and maintenance of sea walls at various points along the shore in the general vicinity of Boston.

Among the works which Mr. Rablin constructed were the Revere Beach Parkway; a dam at Newton Lower Falls, Mass.; the Lynn Shore sea wall; the Nantasket Beach sea wall; shore protection at Revere and Winthrop, Mass.; dam, tide gates and boat lock at Medford, Mass.; the Northern Artery; and approximately twenty-eight bridges, the majority of which were spans of considerable size. Among these are the new bridge on the Old Colony Parkway, the Larz Anderson bridge, over the Charles River, and the Cottage Farm bridge.

He was continually reading and seeking knowledge regarding up-to-date methods and the latest developments in engineering along all the various lines into which the wide diversity of his work led him. He showed a great deal of ingenuity in varying types of construction to avoid duplication.

The following appreciation by Chairman Keniston, of the Metropolitan District Commission, was printed in the "Boston Transcript" shortly after Mr. Rablin's death:

"An able and devoted servant of the Commonwealth, John R. Rablin, passed away this week. Mr. Rablin became assistant engineer to the Metropolitan District Commission in 1899, was appointed chief engineer in 1904, and continued in that capacity until his death. During that time the construction of many public improvements in metropolitan parkways, bridges and reservations came under his direct care. The wise planning and satisfactory completion of these public works was largely due to his engineering skill and attention.

"Mr. Rablin's life work was the development and maintenance of the Metropolitan Parks. He was ever ready

to give freely of his time and strength, and his early death may be attributed in part to his attempt to resume too soon his duties after a serious illness. He still maintained an interest and oversight of his work as long as his strength permitted. The name of the engineer may not be known or remembered by those who enjoy the benefits of the public improvements for which he was responsible, but the works themselves will remain as a tribute to his earnest and successful efforts. May the public occasionally think gratefully of such men as Mr. Rablin."

Mr. Rablin was a man of very decided character, strong in his likes and dislikes, and much beloved by his friends. He was a member of the Society of American Military Engineers; the Boston Society of Civil Engineers; the American Road Builders' Association; the Massachusetts Highway Association; the International Road Congress; the Boston City Club; and the Wollaston Golf Club. He attained the ultimate in golf by "making a hole in one."

On November 15, 1893, Mr. Rablin was married to M. Frances Loring. He leaves, in addition to his widow, a son, Richard Loring Rablin.

Mr. Rablin became a member of the Boston Society of Civil Engineers on October 17, 1906.

Richard Augustus Hale*

DIED DECEMBER 17, 1928

Richard Augustus Hale, the son of Bernice Sargent Hale and Sophia Kidder Hale, was born on December 3, 1852, at Lowell, Mass.

After graduating from the Lowell High School, Mr. Hale entered the office of the late Hiram F. Mills, hydraulic engineer in Boston, Mass. A few months later Mr. Mills was

appointed engineer of the Essex Company in Lawrence, Mass. Young Hale went with him as his assistant, and remained in this office until he entered the Massachusetts Institute of Technology in 1873.

He was graduated from the Massachusetts Institute of Technology in 1877 with the degree of Bachelor of Science in the department of civil engineering. During his four-year course at "Tech," Mr. Hale continued to work during the summer months with the Essex Company, and after receiving his degree he returned to that company, with which he remained associated continuously. In 1886 Mr. Hale was made chief assistant engineer of the company; when Mr. Mills died, on October 4, 1921, he was made engineer, in which capacity he served until his death.

Mr. Hale was an outstanding authority on water power, and made several hundred reports on water-power sources in New England, New York and Delaware. He served as chairman of the commission appointed by the court to investigate and define the water rights of various parties at Hinsdale, New Hampshire, and made measurements for the proper subdivision of the rights involved in that controversy. He also served as an expert in many cases of water diversion where hearings were held before commissions and masters.

In 1894 he was appointed a member of the Lawrence Park Commission, and served in that capacity for twelve years, being chairman of the commission during the latter half of his tenure of office. He was a pronounced golf enthusiast, and traveled about the United States, taking part in many tournaments on different courses.

Mr. Hale was a member of numerous clubs and organizations, including the Appalachian Mountain Club, the American Forestry Association, the Boston

* Memoir prepared by Charles T. Main and Arthur T. Safford.

Society of Civil Engineers, which he served as president in 1916, the New England Water Works Association, the National Geographic Society, the American Civic League, the Massachusetts Civic League, the Merrimack Valley Technology Club, the Technology Club of Boston, the Merrimack Valley Country Club, the Lawrence Canoe Club, the Lawrence Boys' Club, and the Monday Night Club.

He was not merely a member of this long list of clubs, but one to whom membership meant service. His constant attendance at meetings of the different societies, and his willingness to serve on committees, made him always outstanding. For this and his other winning qualities Mr. Hale will long be remembered by his engineering associates, his neighbors and his friends.

His was the unusual distinction of having worked for only one employer during his entire professional career, and that a long one. This includes not only his undergraduate days, but afterward, a single noteworthy service of more than fifty-one years. Few engineers can boast such a remarkable record.

On October 28, 1880, he was married to Arabella Johnson Plummer. Mrs. Hale, three sons, Frank B. Hale, Elliot K. Hale, and Richard A. Hale, Jr., and two daughters, Helen P. Hale and Mrs. Ernest A. Nordon, survive him.

Mr. Hale became a member of the Boston Society of Civil Engineers on March 15, 1882. He was a Director in 1895-96, Vice-President in 1914-15, and President in 1916.

PROCEEDINGS OF THE SOCIETY

MINUTES OF MEETINGS

Boston Society of Civil Engineers

MARCH 19, 1930. — The eighty-second Annual Meeting of the Boston Society of Civil Engineers was held today at the Boston City Club, and was called to order by the President, Frank E. Winsor, at 5.10 P.M.

The reading of the minutes of the previous meeting (February 19, 1930) was omitted, as these are printed in the March JOURNAL.

The President reported the death of the following members:

George Bowers, died February 28, 1930, a member since March 17, 1886.
Hector J. Hughes, died March 1, 1930, a member since April 15, 1903.
Clemens Herschel, died March 1, 1930, a member since June 8, 1874, and honorary member since March 5, 1915.

William E. McClintock, died March 2, 1930, a member since December 15, 1880, and honorary member since December 19, 1923.

Wilbur F. Learned, died March 9, 1930, a member since June 8, 1874.

Both Mr. Herschel and Mr. Learned were members who had taken part in the revival of the activities of the Society on June 8, 1874.

The President announced that committees would be appointed to prepare memoirs.

The annual reports of the Board of Government, Treasurer, Secretary, Committees on Social Activities, Library, Subsoils of Boston, and Floods were presented.

It was *Voted* that these reports be accepted and placed on file. The President announced that these reports would be published in the April JOURNAL.

It was *Voted* that the report of the Committee on Floods be accepted and referred

to the Board of Government, and that the committee be discharged upon completion of the material intended to accompany the text of the report.

It was *Voted* that the Society express its appreciation of the work of the Committee on Floods in assembling and arranging the great amount of data, by a rising vote of thanks.

It was *Voted* that the incoming Board of Government be authorized to appoint such committees as it deemed advisable.

Mr. William D. Henderson presented the report of the Tellers of Election, and in accordance therewith the President announced that the following officers had been elected for the ensuing year:

President — Lewis E. Moore.

Vice-President (for two years) — Ralph W. Horne.

Secretary — Everett N. Hutchins.

Treasurer — Frank O. Whitney.

Directors (for two years) — John B. Babcock, 3d, Harold K. Barrows.

Members of Nominating Committee (for two years) — Waldo F. Pike, John E. Carty, C. Hale Sutherland.

The President introduced Lewis E. Moore, the newly elected President, who responded briefly.

At the request of the President, John P. Wentworth, Chairman of the Desmond Fitzgerald Award Committee, made the presentation of the Desmond Fitzgerald Medal to James W. Rollins for his paper on "Pier Construction for the Mid-Hudson Bridge at Poughkeepsie, N. Y.," which was presented before the Society on May 15, 1929, and published in the October, 1929, *JOURNAL*.

The President announced that the Sanitary Section prize of books, suitably inscribed had been awarded to Robert Spurr Weston for his paper on "Some Examples of Pollution of Streams by Industrial Wastes," presented before the Sanitary Section on March 6, 1929, and published in the June, 1929, *JOURNAL*. Mr. J. P. Wentworth, for the Sanitary Section Prize Committee, made the presentation to Mr. Weston.

The President announced that the Highway Section prize, consisting of books suitably inscribed, had been awarded to

Arthur W. Dean for his paper on "Massachusetts Highways," which was presented before a joint meeting of the Highway Section and the Society on November 20, 1929, and printed in the December, 1929, *JOURNAL*. Mr. Edward S. Larned, a member of the Committee on Highway Section Prize, made the presentation.

The President stated that the Board had voted to award a copy of the late Clemens Herschel's book, entitled "Frontinus and the Water Supply of the City of Rome," to William F. Uhl for his paper on "The Development of the Mongaup River," which was given before the Society on February 20, 1929, and published in the May, 1929, *JOURNAL*. Mr. Uhl was unable to be present to receive the award personally.

The retiring President, Frank E. Winsor, then delivered his annual address on "Some Changes since Boston was Settled Three Hundred Years Ago."

The business meeting adjourned at 6.25 P.M., and the members attended the dinner and entertainment arranged by the Committee on Social Activities. The entertainment consisted of feature acts from this year's Tech show, "Snobberies of 1930," a humorous broadcast, and a talk on "Various Uses of Inflammable Oils," illustrated with demonstrations by Past President Charles M. Allen of Worcester Polytechnic Institute.

About 200 members and guests were present.

Adjourned about 9.30 P.M.

EVERETT N. HUTCHINS, *Secretary*.

Sanitary Section

MARCH 5, 1930. — Annual meeting. Preceding the meeting 20 members attended dinner at Patten's Restaurant. The meeting was called to order at 7.15 by the Chairman.

The annual report of the Executive Committee was read, and it was voted to be placed on file.

The report of the Nominating Committee was read and accepted.

It was *Voted* that nominations be closed, and that the clerk be instructed to cast one ballot for the nominees presented by the

Nominating Committee. The clerk cast one ballot as directed.

The following officers were elected for the ensuing year:

Chairman — Harrison P. Eddy, Jr.
 Vice Chairman — Francis H. Kingsbury.
 Clerk — George G. Bogren.
 Executive Committee — Harry P. Burden,
 R. W. Loud, Austin L. Maddox.

Messrs. Eddy, Jr., and Burden responded to a popular request for speeches with a few timely remarks.

The speaker of the evening, Theodore F. Hatch, Harvard Engineering School, was introduced, who gave an illustrated talk on "Industrial Sanitation," pertaining particularly to the dust hazard in certain industries. The subject proved most interesting, especially since it disclosed the results of scientific research on a phase of industrial health hazard about which very little has been published.

The paper was discussed by Messrs. Burden, Chase, Eddy, Jr., Wright and Fair.

Attendance, 32.

The meeting adjourned at 8.45 P.M.

GEO. G. BOGREN, *Clerk*.

Designers Section

MARCH 12, 1930. — The annual meeting of the Designers Section was called to order by the Chairman, Hale Sutherland, at 6.10 P.M., in the Affiliation Rooms.

The minutes of the February meeting were read and approved. The report of the Nominating Committee was read by Waldo F. Pike, Chairman.

It was voted that the nominations be closed, and the Chairman instructed the clerk to cast one ballot for the candidates selected by the Nominating Committee.*

The officers elected for the year 1930-31 were as follows:

Chairman — Norman P. Randlett.
 Vice Chairman — LeRoy M. Hersum.
 Clerk — Lawrence G. Ropes.
 Executive Committee — Richard W. Sherman, Edward Grossman, Clarence R. Bliss.

The Chairman then introduced as the speaker of the evening, Prof. L. J. Johnson

of Harvard University. He discussed with blackboard illustrations the "Circle of Stress," and applied it to the solution of many practical problems. General discussion followed.

There were 22 members and visitors present.

The meeting adjourned at 7.40 P.M.

LAWRENCE G. ROPES, *Clerk*.

Highway Section

FEBRUARY 26, 1929. — The annual business meeting of the Highway Section was held Wednesday February 26, in the Engineering Societies' rooms.

The Chairman, Prof. Charles B. Breed, called the meeting to order at 7.10 P.M. The reading of the minutes of the preceding meeting was omitted. The report of the Executive Committee for the past year was read and accepted.

The report of the Nominating Committee was read by Mr. R. W. Coburn. The clerk was instructed to cast one vote for the nominees presented by the Nominating Committee.

The following officers were elected for the coming year:

Chairman — James E. Lawrence.
 Vice-Chairman — James W. Ingalls.
 Clerk — Ernest Mathers.
 Executive Committee — Athole B. Edwards, Francis T. McAvoy, Edwin H. Rogers.

Mr. Lawrence then took charge of the meeting, introducing the speaker of the evening, Mr. James H. Taylor, Landscape Engineer of Massachusetts Department of Public Works. Mr. Taylor gave a very interesting illustrated talk on "Highway Beautification." He emphasized the importance of a smoothly flowing highway, and showed slides illustrating the gratifying results obtained by thoughtful clearing, border planting, and attention to existing roadside plants and trees.

At the conclusion of his talk Mr. Taylor was given a rising vote of thanks.

A discussion followed in which Professor Breed and Mr. Delano took part.

Twenty members and guests were present.

The meeting adjourned at 9.10 P.M.

ERNEST MATHERS, *Clerk*.

Northeastern University Section

FEBRUARY 28, 1930. — The Northeastern University Section of the Boston Society of Civil Engineers held its monthly meeting at 7.30 P.M. in Room 26 of the Huntington Building. President, Fred E. Hess, called the meeting to order, and, after a short business discussion, closed the business meeting.

President Hess introduced as the speaker Mr. Harry E. Sawtell, Structural Engineer for Chas. T. Main, Inc. Mr. Sawtell presented an illustrated talk on "Wood Preservatives," in which he described the various kinds of preservatives in industrial use today, and their relative advantages and disadvantages. He explained why such preservatives as creosote and corrosive sublimate were impractical in industrial use, and that the only economically sound preservative was sodium fluoride for appearance, durability and strength.

Samples of woods so treated were shown by Mr. Sawtell and his assistant, Mr. Charles W. Robinson, of the Chas. T. Main, Inc., Laboratory, and the tests for the penetration of the preservatives were also shown. The speaker described the methods of applying the preservative and the relative penetration values of each by the use of illustrated slides. In closing, Mr. Sawtell stated that sodium fluoride as a wood preservative has a pronounced future ahead in the protection and upkeep of framed structures.

Seventeen members and guests were present, and all extended a vote of thanks to Mr. Sawtell for his interesting talk.

After refreshments were served the meeting was adjourned at 10 P.M.

ERNEST S. HILL, *Clerk.*

APPLICATIONS FOR MEMBERSHIP

[April 20, 1930]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission

and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of fifteen (15) days from the date given.

For Admission

DRISKO, JOHN B., Winchester, Mass. (Age 24, b. Winchester, Mass.) Graduate of Massachusetts Institute of Technology in 1927. From 1927-29, studied hydraulics in Germany. In 1929 was appointed assistant in civil engineering at Technology. Refers to *J. B. Babcock, H. K. Barrows, J. R. Freeman, K. C. Reynolds, C. M. Spofford.*

ENGBORG, ARNOLD HENRY, West Somerville, Mass. (Age 24, b. Cambridge, Mass.) Graduate of Harvard Engineering School in 1927, with degree of B.S. in civil engineering. From July, 1927, to October, 1928, assistant engineer and junior engineer, tunnel division, Board of Transportation, New York City; November, 1928, to October, 1929, resident inspector for H. K. Barrows on construction of pumping station and purification plant at Lebanon, N. H.; from October, 1929, to date, assistant in office of H. K. Barrows. Refers to *H. K. Barrows, G. M. Fair, R. S. Holmgren, L. J. Johnson.*

HULL, EDWARD KNEVALS, Brookline, Mass. (Age 37, b. Jamaica Plain, Mass.) Two years undergraduate, Tufts Engineering School, five years instructor in mathematical drawing. From 1922-24, in oil burner work as heating and ventilating engineer; three and a half years with Blackall, Clapp & Whittemore, structural

engineering; and from 1928 to date, with Beacon Oil Company as structural engineer and heating. Refers to *K. R. Garland, E. D. Kingman, Mark Linenthal, F. J. McCann.*

VADER, THEODORE MARTIN, Brookline, Mass. (Age 24, b. Medixrun, Pa.) Graduate of Baldwinsville High School, and now a student at Northeastern University. Has worked for the New York State Highway, and now working as transitman for H. S. Truman of Hartford, Conn., during co-operative periods. Refers to *H. B. Alvord, C. O. Baird, J. W. Greenleaf, V. L. Stone.*

For Transfer to Grade of Member

ELLSWORTH, SAMUEL M., Braintree, Mass. (Age 35, b. Braintree, Mass.) Graduate of Massachusetts Institute of Technology. Experience: transitman to assistant engineer, Massachusetts State Department of Health, 1.7 years; United States Army, 26th Engineers, 1.5 years; assistant engineer on water reports on water supply and sewerage, 1.5 years; resident engineer, on concrete pavements, Massachusetts Department of Public Works, 7 months; assistant engineer, investigations of water supply, Weston & Sampson, 1.7 years; construction and miscellaneous investigations, North Jersey District Water Supply, 1.7 years; assistant engineer, sewer and sewage treatment plant and water supply design, Metcalf & Eddy, 3.6 years. Refers to *E. S. Chase, G. M. Fair, N. L. Hammond, R. S. Weston.*

NEW MEMBERS

Members

- WILLIAM F. DONOVAN, 204 Kendrick Avenue, Quincy, Mass.
 ARTHUR J. GIURANOVICH, 38 Hemenway Street, Boston, Mass.
 JOSEPH I. LAMB, 99 Elmwood Avenue, Wollaston, Mass.
 FRANK LOUIS LINCOLN, 190 Hillside Avenue, Arlington Heights, Mass.
 CHESTER A. RING, JR., 1824 Beacon Street, Boston, Mass.
 CHARLES E. THRASHER, G. B. H. Macomber Company, 38 Chauncy Street, Boston, Mass.

Juniors

- LAWRENCE S. BURKE, 6 Weston Place, Boston, Mass.
 RAYMOND E. EDSON, Windsor Avenue Extension, East Lynn, Mass.
 ARNOLD L. GUILD, 1003 South Street, Roslindale, Mass.
 DONALD F. LIBBY, 8 Autumn Street, Everett, Mass.
 ALFRED A. LOCKERBIE, 18 Darling Street, Marblehead, Mass.
 PETER C. MALKOWSKI, 5 Carlton Street, Salem, Mass.
 ARTHUR R. MURPHY, 19 Empire Avenue, Brockton, Mass.
 DAVID OLKEN, 171 Elm Street, Cambridge, Mass.
 EDWIN J. O'CONNOR, 52 Pickering Street, Danvers, Mass.

DEATH

- LAWRENCE E. KILPATRICK, Mar. 19, 1930

BOOK REVIEW

*"Sewerage and Sewage Disposal," by Leonard Metcalf and Harrison P. Eddy. Second Edition, revised. 21 Chapters; 781 pp., including index; 111 Tables; 224 Figures. McGraw-Hill Book Company, New York, 1930. Price \$6.**

This book appeared in 1921 as an abridgment of the author's larger treatise, "American Sewerage Practice," the revised first volume of which has recently been published. While the first edition of the shorter work was intended for use by engineering classes, it has been largely rewritten to make it more suitable for use as a textbook, with the assistance of Prof. Gordon M. Fair of Harvard University, Professor Tyler of the Massachusetts Institute of Technology, and members of the staff of Metcalf & Eddy, and with the advice of many teachers of sanitary engineering.

The book covers with brief statements the whole field of sewerage and sewage disposal, beginning with an excellent in-

* Reviewed by Robert Spurr Weston, Consulting Engineer, Weston & Sampson, 14 Beacon Street, Boston, Mass.

roduction and ending with a chapter on financial considerations.

Proceeding logically from chapters on quantities of sewage and storm water and their measurement, and chapters on the hydraulics of sewers, through chapters on the design and construction of sewerage systems and appurtenances, there follow chapters on the characteristics, behavior and treatment of sewage itself. Somewhat more than half of the book is given to the latter subjects.

The first reading of the book impresses one with the wealth of information contained in small compass, the clearness of the explanations, and the conservative treatment of questions which are more or less controversial. The relative spaces allotted to each subject seem generally reasonable, although emphasis placed upon some of the infrequently used methods, like irrigation, better suits a textbook than a reference book for engineers.

Practically every subject is covered, and where omissions are made, references to other works are given. The descriptions of methods and processes are accurate, and

there is an abundance of tabular and diagrammatic material. To some, the expansion of the section regarding the significance of the Plankton with reference to the character of waters receiving sewage would have seemed to be in accord with the rest of the book. More information regarding the efficiency of processes would have been welcome.

Some of the material is remarkably fresh. The book includes, for example, reference to the hydraulic work of Shoder, published in 1929; examples of recent construction and construction methods; and full discussions of such relatively new processes of sewage treatment as the aeration of trickling filter influents, submerged contact aerators, and sewage sludge digestion in separate tanks.

As a textbook the work is the best of its kind. The arrangement of data is so convenient that the book will be of much use to practicing sanitary engineers, whose libraries should not be without a copy of this painstaking, fundamentally informing and progressive book.

ANNUAL REPORTS

Report of the Board of Government for the Year 1929-30

BOSTON, March 19, 1930.

To the Boston Society of Civil Engineers:

Pursuant to the requirements of the By-Laws, the Board of Government presents its report for the year ending March 19, 1930.

Membership

Seventy-eight members in all grades have been added during the year, of whom 6 were former members reinstated. Thirteen juniors have been transferred to the grade of member.

During the year 13 members have died, 12 have resigned, 31 have forfeited membership for non-payment of dues, making the total deductions 56.

The present membership of the Society consists of 4 honorary members, 837 members, 201 juniors, 21 associates, and 2 members of the Sanitary Section only, making a total membership of 1,065, a net gain for the year of 22.

Deaths

Edward B. Waite, November 3, 1928 (reported May 10, 1929).
John E. L. Monaghan, April 29, 1929.
Henry F. Bryant, June 16, 1929.
William Fish Williams, October 1, 1929.
Herbert F. Pierce, October 27, 1929.
Lemuel Pope, October 31, 1929.
Edwin H. Lincoln, December 8, 1929.
Guy H. Chase, January 26, 1930.
George Bowers, February 28, 1930.
Hector James Hughes, March 1, 1930.
Clemens Herschel, March 1, 1930.
William E. McClintock, March 2, 1930.
Wilbur F. Learned, March 9, 1930.

Remission of Dues

Under authority of By-Law 8, the Board of Government has remitted the dues of 2 members.

Exemption from Dues

Seventy-six members have been exempt from dues in accordance with By-Law 8, which provided that "a member of any grade who has paid dues for forty years, or who has reached the age of seventy years and has paid dues for thirty years, shall be exempt from further dues."

Meetings of the Society

Eight regular meetings have been held during the year, and a joint outing with the New England Water Works Association on June 18, 1929, at the New Ocean House, Swampscott. The December meeting was held jointly with the Highway Section of the Society. The October meeting was omitted to provide an opportunity for members of the Society to participate in the technical sessions of the fall meeting of the American Society of Civil Engineers, held in Boston on October 9 and 10, 1929.

The average attendance at the meetings of the Society was 178, the largest being 325 and the smallest 90. Buffet suppers have been a feature of all the meetings. At these meetings papers and addresses have been given, as follows:

March 20, 1929. — Annual meeting. Address of retiring President, Charles B. Breed, "Arbitration;" followed by smoker and entertainment.

April 17, 1929. — "Westchester County, New York, Park and Parkway Developments," by Leslie G. Holleran, Deputy Chief Engineer, and "The Development of Rigid Frame Bridge Construction as Applied Particularly to Grade Crossing Structures," by Arthur G. Hayden, Designing Engineer, Westchester County Park Commission, New York.

May 15, 1929. — "Pier construction for the Mid-Hudson Bridge at Poughkeepsie, N. Y.," by James W. Rollins, Vice-President of the Blakeslee-Rollins Corporation.

September 25, 1929. — "The Economic Application of Aerial Surveys," by J. F. Bagley, Jr., of Fairchild Aerial Surveys, Inc.

November 20, 1929. — "Massachusetts Highways," by Arthur W. Dean, Chief Engineer, Massachusetts Department of Public Works.

December 18, 1929. — "Recent Terminal Improvements by the Boston & Maine Railroad," by Frank C. Shepherd, Consulting Engineer, Boston & Maine Railroad.

January 22, 1930. — "Fire Protection Engineering as applied to Municipalities," by Kenneth F. Akers, Fire Prevention Engineer, with Fay, Spofford & Thorndike.

February 19, 1930. — Joint meeting with the Student Civil Engineering Societies of the Massachusetts Institute of Technology, Harvard Engineering School, Tufts College and Northeastern University. "Hydraulic and Mechanical Features of the Bellows Falls Hydro-Electric Plant," by Edwin A. Dow, Designing Engineer, of the New England Power Construction Company. With discussions by Howard M. Turner, Harold K. Barrows, Mr. Dow and others.

Sanitary Section Meetings

The Sanitary Section has held six meetings during the year, with an average attendance of 28. The following papers have been presented:

March 6, 1929. — Annual meeting. "Some Examples of Pollution of Streams by Industrial Wastes," by Robert Spurr Weston, of Weston & Sampson.

June 5, 1929. — Regular meeting. No paper presented.

October 2, 1929. — "Some of the Sanitary Menaces of Recreation," by Dr. George H. Bigelow, Massachusetts Commissioner of Public Health.

November 6, 1929. — "The Effect of Industrial Wastes on Sewage Disposal Plants, with Especial Reference to Fostoria, Ohio," by E. Sherman Chase, of Metcalf & Eddy.

December 4, 1929. — Mr. Francis H. Kingsbury, Assistant Engineer, Massachusetts Department of Public Health, and Secretary of the commission investigating the sanitary condition of Boston Harbor, spoke on the "Sewerage of Metropolitan Boston."

February 5, 1930. — "Italian Marshes, Bavarian Fish Ponds, Rhenish Rivers and Dutch Canals—Impressions of an Itinerant Sanitary Engineer," by Prof. Gordon M. Fair of the Engineering School, Harvard University, with discussion by Harrison P. Eddy, Jr., of Metcalf & Eddy.

Designers Section Meetings

The Designers Section has held seven meetings during the year. The average attendance has been 65. The following papers have been presented:

March 13, 1929. — "The 1928 Joint Standard Building Code of the American Concrete Institute," by Prof. Dean Peabody, Jr., and Prof. Hale Sutherland, of Massachusetts Institute of Technology, Charles E. Nichols, of Stone & Webster Engineering Corporation, Boston, Mass., Prof. Walter C. Voss, of Massachusetts Institute of Technology, and R. R. Zippodt, of the Portland Cement Association.

April 10, 1929. — "The Design of the Ware River Shaft, Wachusett-Coldbrook Tunnel," by Clarence R. Day, Assistant Engineer, Metropolitan District Water Supply Commission.

June 19, 1929. — "Recent Experiments with Earth Pressure on Retaining Walls," by Dr. Charles Terzaghi, of Massachusetts Institute of Technology.

November 13, 1929. — "Structural Problems in Airplane Design," by Prof. Joseph S. Newell, of Massachusetts Institute of Technology.

December 11, 1929. — "The Protection of Exposed Concrete Surfaces," by Angus B. MacMillan, Chief Engineer, of the Aberthaw Company.

January 8, 1930. — "Practical and Impractical in Steel Design," by John C. Moses, Chief Engineer, Boston Bridge Works, Inc.

February 5, 1930. — "Ready Mixed Concrete," by Miles N. Clair, Vice-President, Thompson & Lichtner Company.

Highway Section Meetings

The Highway Section has held three meetings during the year, with an average attendance of 91.

February 27, 1929. — Annual meeting. "The Hot Mix Type of Highway Surfacing," by Howard C. Holden, District Engineer, Massachusetts Department of Public Works.

October 16, 1929. — Highway inspection trip, covering the Soldiers Field Road in Allston and Alewife Brook Parkway in Cambridge and Somerville.

November 20, 1929. — Joint meeting with the Boston Society of Civil Engineers. "Massachusetts Highways," by Arthur W. Dean, Chief Engineer, Massachusetts Department of Public Works.

Northeastern University Section Meetings

The Northeastern University Section has held, thus far, four meetings during the year, with an average attendance of 25.

April 12, 1929. — Annual meeting. "Engineering Problems, Metropolitan District Commission," by Edwin H. Rogers, Chief Engineer, Parks Division, Metropolitan District Commission.

October 3, 1929. — "Boston Rapid Transit Development," by William W. Lewis, Assistant Engineer, Boston Rapid Transit Department.

November 12, 1929. — "Construction of the Cascade Tunnel," by Prof. Henry B. Alvord, Head of the Civil Engineering Department, Northeastern University.

February 28, 1930. — "Wood Preservatives," by Harry E. Sawtell, Structural Engineer, Chas. T. Main, Inc., Boston.

Journal

The report of the Editor of the JOURNAL for the calendar year 1929 shows that there have been printed ten issues, containing a total of 641 pages, and an average of 1,572 copies of each issue was printed. The net cost in 1928 was \$2,554.11, or \$4.15 per

page. The net cost of the JOURNAL in 1929 was \$2,854.17, or \$4.45 per page. The report of the Editor will be printed in the April JOURNAL.

Permanent Fund

The Society again authorized the use of the income of the Permanent Fund in payment of current expenses. Details concerning the fund will be found in the Treasurer's report.

FitzGerald Fund

The present value of the fund established by a bequest from the late Desmond FitzGerald, a Past President and Honorary Member of the Society, is \$2,217.16. The income from this fund is to be used for charitable and educational purposes. No appropriations have been made from this fund during the year.

Freeman Fund

Samuel Shulits has held the Freeman Fund Traveling Scholarship during the year. The scholarships provide for a year's study and work in the European Hydraulic Laboratories. Mr. Shulits also held this scholarship during the year 1928-29. No other appropriations have been made from this fund during the year.

Tinkham Memorial Fund

The "Samuel E. Tinkham Fund," established at the Massachusetts Institute of Technology by the Society "to assist some worthy student of high standing to continue his studies in civil engineering," had a value of \$2,401.18 on July 1, 1929. The annual income from this fund is about \$125. Mr. James G. Muir of Boston, Massachusetts, a student in civil engineering in the class of 1930 at Technology, has been awarded this scholarship for the year 1929-30.

Attention is called to the fact that the tuition at the Massachusetts Institute of Technology is now \$400 per year, and is to be increased to \$500 per year, whereas the income from the Tinkham Fund is about \$125. Additional donations to this fund would make it of greater service for the purpose for which it was established.

Desmond FitzGerald Medal

In accordance with the report of the Committee, to recommend the award of the Desmond FitzGerald Medal for the best paper by a member of the Society, published during the year, the Board has awarded a medal to Past President James W. Rollins for his paper on "Pier Construction for the Mid-Hudson Bridge at Poughkeepsie, N. Y.," presented before the Society on May 15, 1929, and published in the October, 1929, JOURNAL.

Section Prizes

The Board voted on April 12, 1924, "to present a prize for a worthy paper given in each Section by a member of that Section," this award to consist of books suitably inscribed. The Board has adopted the recommendations of the special committees on Section awards, and has voted that prizes be awarded this year as follows:

Sanitary Section. — To Robert Spurr Weston, for his paper on "Some Examples of Pollution of Streams by Industrial Wastes," presented before the Sanitary Section on May 6, 1929, and printed in the June, 1929, JOURNAL.

Highway Section. — To Arthur W. Dean, for his paper on "Massachusetts Highways," presented before a joint meeting of the Boston Society of Civil Engineers and the Highway Section on November 20, 1929, and printed in the December, 1929, JOURNAL.

Clemens Herschel Award

Clemens Herschel, Past President and honorary member of the Society, had continued his gift of copies of his book on "Frontinus and the Water Supply of Rome," with the request that the Board award one or more of these books each year as prizes for papers which have been particularly useful and commendable, and worthy of grateful acknowledgment.

The Board has voted to present at this time a copy of this book to William F. Uhl for his paper on "The Development of the Mongaup River," presented before the Society on February 20, 1929, and published in the May, 1929, JOURNAL.

Sections

Nineteen meetings and one inspection trip were held by the Sections of the Society during the year. These meetings of the Sections, offering opportunity for less formal discussion, have continued to demonstrate their value to their members and to the Society. The variety of subjects presented has made an appeal to the members as indicated by the general increase in attendance. The Highway Section has increased its membership 37 per cent. Prizes have been awarded to members of the Sections for papers presented at meetings this year.

Social Activities

Buffet suppers and smokers have been held before the meetings of the Society, under the direction of the Social Activities Committee. It is believed that the members of the Society appreciate the endeavors of this Committee to render prompt and satisfactory service, accompanied with a spirit of optimism, which make these affairs well worth attending.

Library

The report of the Committee on Library contains a complete account of the library activities during the year. In accordance with the vote of the Board of Government the Library Committee has removed from the shelves periodicals which have been considered of less value in order to obtain space for future issues of periodicals of greater value. These books will be disposed of by the Library Committee.

Society Activities

The membership of the Society is now 1,065, the largest in its history. The Committee on Membership and Publicity has devoted its attention principally to securing new members. The chairman of that committee believes that more attention should be devoted to publicity during the coming year.

The Society has co-operated with the Engineering Societies of Boston in its program, and many members of the Society have served on Engineering Societies' committees.

During the past year there have been three special committees at work: the Committee on Subsoils of Boston, which has continued its excellent work of securing

and making available information about foundation conditions of Boston and vicinity; the Flood Control Committee, which is collecting and analyzing data relative to the New England Flood of November, 1927, a final report of which will be presented at this meeting; and a special committee of the Board to study the matter of the practice of using an arbitration clause in construction contracts for the settlement of all or a stipulated part of existing and future controversies arising out of a contract. In accordance with the provisions of the Constitution relating to endorsements by the Society, this matter has been submitted to members for a vote by ballot on April 16 next, reference being made to the address on "Arbitration" delivered by Past President Charles B. Breed at the 1929 Annual Meeting which was printed in the April, 1929, JOURNAL.

Your Board, in conclusion, wishes to express its appreciation of the excellent work done by the officers of the Sections and by the committees of the Society.

For the Board of Government,

FRANK E. WINSOR, *President*.

Report of the Treasurer

BOSTON, March 1, 1930.

To the Boston Society of Civil Engineers:

Your Treasurer presents the following report for the year ending March 1, 1930.

Detailed data are contained in the appended tabular statement: Table 1 gives the Receipts and Expenditures for the year; Table 2, Comparative Balance Sheet; Table 3, Investment of the Permanent Fund, Turner Fund, Freeman Fund and FitzGerald Fund.

The Current Expenses for the year amount to \$11,613.54, being \$415.28 more than for the preceding year.

There has been transferred to the Current Fund all the income of the Permanent Fund for the current year, \$2,543.94.

The net expenses of the JOURNAL have been \$986.94 more than last year. The income from advertisements decreased \$89, and the sale of JOURNALS and reprints has been \$235.90 more than last year.

There has been an increase in the Permanent Fund of \$812.50 after transferring the income for the current year of \$2,543.94 to the Current Fund.

The Freeman Fund has remained unchanged as to principal. The accumulated income amounts to \$1,904.81.

Respectfully submitted,

F. O. WHITNEY, *Treasurer*.

TABLE 1. — RECEIPTS AND EXPENDITURES

Current Fund	
<i>Receipts</i>	
Balance March 1, 1929	\$489 08
Members dues	7,793 99
Advertisements	1,168 00
Sale of JOURNALS and reprints	608 92
Library fines	17 75
Waste paper sold	3 50
Income from Permanent Fund	2,543 94
	\$12,625 18
<i>Expenditures</i>	
JOURNAL:	
Printing	\$3,539 64
Incidentals	20 00
Reprints	472 39
Editor	450 00
	\$4,482 03
Rent, meetings	214 05
Salary of Secretary	300 00
Printing, stationery, postage, etc., meetings	303 53
Printing, stationery, postage, etc., office	354 02
Incidentals, office	89 42
Reporting, meetings	53 50
Stereopticon, meetings	44 10
Binding (net) (\$180.90 minus \$38.00)	142 90
Insurance	31 14
Periodicals	151 83
Annual meeting	181 24
Social Activities (net) (\$718.71 minus \$319.32)	399 39
Engineering Societies of Boston	4,535 00
Designers Section	85 26
Sanitary Section	29 70
Highway Section	26 35
Northeastern University Section	39 95
Prizes	12 60
Library	87 51
Year Book	50 02
Badges (net) (\$198.00 minus \$198.00)	—
Balance March 1, 1930	1,011 64
	\$12,625 18
Permanent Fund	
<i>Receipts</i>	
Balance March 1, 1929	\$1,678 68
Interest received (net)	1,432 33
Entrance fees	550 00
American Tel. & Tel. Co., bonds matured	3,000 00
Dayton Gas Co., bonds matured	2,000 00
	\$8,661 01

Expenditures

Eliot Savings Bank, deposited	\$3,000 00	
American Tel. & Tel. Co., bonds	600 00	
American Tel. & Tel. Co., rights purchased	7 50	
Co-operative banks (net)	957 02	
Income transferred to Current Fund	2,543 94	
Balance March 1, 1930	1,552 55	
		<u>\$8,661 01</u>

Edmund K. Turner Fund*Receipts*

Balance March 1, 1929	\$25 17	
Interest on bond	50 00	
		<u>\$75 17</u>

Expenditures

Books purchased	\$49 55	
Balance March 1, 1930	25 62	
		<u>\$75 17</u>

John R. Freeman Fund

PRINCIPAL

Receipts

Balance March 1, 1929	\$329 66	
Pacific Gas & Elec. Co., rights sold	11 23	
		<u>\$340 89</u>

Expenditures

So. Calif. Edison Co., rights purchased	\$18 75	
5 shares So. Calif. Edison Co., com. purchased	125 00	
14 shares Pacific Gas & Elec. Co., com. purchased	500 00	
Pacific Gas & Elec. Co., right purchased	16 00	
		<u>659 75</u>
Deficit March 1, 1930		<u>\$318 86</u>

INTEREST

Receipts

Balance March 1, 1929	\$1,762 79	
Dividends received	1,785 73	
		<u>\$3,548 52</u>

Expenditures

Traveling scholarships	\$1,643 71	
Balance March 1, 1930	1,904 81	
		<u>\$3,548 52</u>

Desmond FitzGerald Fund*Receipts*

Balance March 1, 1929	\$112 16	
Interest on bonds	100 00	
		<u>\$212 16</u>
Balance March 1, 1930		

TABLE 2. — COMPARATIVE BALANCE SHEET

	March 1, 1927	March 1, 1928	March 1, 1929	March 1, 1930
<i>Assets</i>				
Cash	\$6,085 24	\$4,673 70	\$4,397 54	\$4,387 92
Bonds and notes	28,997 50	32,007 50	26,065 00	21,935 00
Stock	27,972 80	28,892 35	29,094 88	29,743 40
Co-operative banks . . .	14,966 10	15,210 75	16,328 60	18,240 95
Savings bank	—	—	3,087 80	6,244 08
Library	7,500 00	7,500 00	7,500 00	7,500 00
Furniture	2,405 11	2,405 11	2,405 11	2,405 11
	\$87,926 75	\$90,689 41	\$88,878 93	\$90,456 46
<i>Liabilities</i>				
Permanent Fund	\$48,448 76	\$49,348 76	\$47,875 87	\$48,688 37
E. K. Turner Fund	1,010 10	1,042 10	1,018 92	1,019 37
Current Funds	187 88	60 79	489 08	1,011 64
J. R. Freeman Fund . . .	28,374 90	28,437 07	27,472 79	27,614 81
Desmond FitzGerald . . .	—	2,017 16	2,117 16	2,217 16
Surplus	9,905 11	9,905 11	9,905 11	9,905 11
	\$87,926 75	\$90,689 41	\$88,878 93	\$90,456 46

TABLE 3. — INVESTMENT OF PERMANENT, EDMUND K. TURNER, JOHN R. FREEMAN, AND DESMOND FITZGERALD FUNDS, MARCH 1, 1930

PERMANENT FUND

	Par Value	Actual Cost	Value as carried on Books
Bonds			
American Tel. & Tel. Co., conv. 4½%, 1930	\$600 00	\$607 50	\$607 50
Union Elec. Light & Power Co., 5%, 1932	2,000 00	2,050 00	2,050 00
Blackstone Valley Gas & Elec. 5%, 1939	2,000 00	1,995 00	1,995 00
Superior Water, Light & Power Co. 4%, 1931	4,000 00	3,347 50	3,347 50
Wheeling Electric Co. 5%, 1941	4,000 00	3,845 00	3,845 00
Economy Light & Power Co. 5%, 1956	1,000 00	990 00	990 00
Tampa Electric Co. 5%, 1933	2,000 00	2,000 00	2,000 00
Chicago & Northwestern Ry. 5%, 1987	1,000 00	1,102 50	1,102 50
Public Electric Light Co. 5½%, 1956	1,000 00	1,000 00	1,000 00
American Tel. & Tel. Co. 5%, 1946	1,000 00	993 75	993 75
Arkansas Water Co. 5%, 1956	1,000 00	1,005 00	1,005 00
	\$19,600 00	\$18,936 25	\$18,936 25
Stock			
34 shares Amer. Tel. & Tel. Co.	3,400 00	3,714 54	3,714 54
Total securities	\$23,000 00	\$22,650 79	\$22,650 79
Co-operative Banks			
40 shares Merchants Co-operative Bank, including interest to March		\$2,401 00	
40 shares Volunteer Co-operative Bank, including interest to January		4,458 35	
10 matured shares Merchants Co-operative Bank		2,000 00	
10 matured shares Volunteer Co-operative Bank		2,000 00	
40 shares Watertown Co-operative Bank, including interest to September		7,381 60	
			18,240 95
Lynn Five Cent Savings Bank			3,244 08
Eliot Savings Bank			3,000 00
Cash			1,552 55
Total value of Permanent Fund			\$48,688 37

EDMUND K. TURNER FUND

	Par	Book Value
American Tel. & Tel. Co. 5%, 1946	\$1,000 00	\$993 75
Cash on hand	—	25 62
Total	—	\$1,019 37

JOHN R. FREEMAN FUND

	Book Value
10 shares New England Power Co. pf. 6%	\$960 00
10 shares New England Power Assoc. pf. 6%	970 00
10 shares Allied Power & Light Corp. pf. 5%	} 1,050 00
10 shares Allied Power & Light Corp. com.	
10 shares Carolina Power & Light Co. 7%	1,020 00
20 shares Amer. Super. Power Corp. pf. 6%	1,940 00
14 shares Georgia Power Co. pf. 6%	1,143 33
10 shares Alabama Power Co. pf. 7%	980 00
10 shares Electric Power & Light Co. pf. 7%	1,000 00
10 shares Tenn. Electric Power Co. pf. 7%	950 00
10 shares West Penn. Power Co. pf. 7%	1,030 00
10 shares Minn. Power & Light Co. pf. 7%	980 00
10 shares Miss. River Power Co. pf. 6%	900 00
10 shares Southwestern Power & Light pf. 7%	980 00
10 shares Utah Power & Light Co. pf. 7%	990 00
40 shares Pacific Gas & Electric Co. pf. 6%	932 02
58 shares Pacific Gas & Electric Co. com. 8%	1,653 54
10 shares Great Western Power Co. pf. 7%	990 00
40 shares Southern Calif. Edison Co. pf. 8%	1,161 22
9 shares Southern Calif. Edison Co. com. 8%	243 75
10 shares Northwestern Elec. Co. pf. 7%	980 00
10 shares Consumers Power Co. pf. 6%	1,020 00
30 shares Montreal Light, Heat & Power Co. com. \$2	1,200 00
30 shares Penn. Gas & Electric Light Co. pf. 7%	2,955 00
	\$26,028 86
Cash, principal (deficit)	318 86
	\$25,710 00
Accumulated interest	1,904 81
Total	\$27,614 81

DESMOND FITZGERALD FUND

	Par	Book Value
Bonds		
Southwestern Gas & Electric Co. 5%, 1957	\$1,000 00	\$1,000 00
Central Power & Light Co. 5%, 1956	1,000 00	1,005 00
	—	\$2,005 00
Cash on hand	—	212 16
Total	—	\$2,217 16

REPORT OF AUDITING COMMITTEE FOR THE YEAR 1929-30

MARCH 15, 1930.

We have examined the accounts of the Treasurer of the Boston Society of Civil Engineers and find the books properly kept and the various expenditures of the past year supported by duly approved receipts.

The Treasurer has also accounted to us for the investments and cash on hand, as submitted by the above reports.

EDWARD H. CAMERON,
ARTHUR L. SHAW,

*Auditing Committee of Directors of the
Boston Society of Civil Engineers.*

Report of the Secretary

BOSTON, MASS., March 19, 1930.

EVERETT N. HUTCHINS, Secretary, *in account with the* BOSTON SOCIETY OF CIVIL ENGINEERS, *Dr.*

For cash received during the year ending March 19, 1930:

From entrance fees, new members and transfers:

25 new members and associates at \$10 00	\$250 00
47 juniors at 5 00	235 00
13 juniors transferred to members 5 00	65 00

Total from entrance fees	\$550 00
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From annual dues for 1929-30, including dues from new members \$7,637 49

From back dues 86 00

From dues for 1930-31 70 50

Total from dues	7,793 99
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From advertisements 1,168 00

From sale of JOURNALS 206 05

From reprints 402 87

From library fines and miscellaneous 21 25

From sale of badges 198 00

From binding JOURNALS 38 00

From Social Activities Committee (smokers) 319 32

	\$10,697 48
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The above amount has been paid to the Treasurer, whose receipts the Secretary holds.

The appended table shows the estimated and the actual expenditures for the year.

EVERETT N. HUTCHINS, *Secretary.*

COMPARISON OF ESTIMATED AND ACTUAL EXPENDITURES, 1929-30

<i>Office:</i>	Estimated Expenditures	Actual Expenditures	
Salaries (except Editor)	\$375 00	\$300 00	
Insurance and Treasurer's bond	35 00	31 14	
Stationery, printing and postage	350 00	354 02	
Incidentals	100 00	89 42	
Periodicals and binding	375 00	294 73	
Library	150 00	87 51	
Prizes	15 00	12 60	
Year Book	—	50 02	
Total	—————	\$1,400 00	\$1,219 44
<i>Meetings:</i>			
Rent	\$220 00	\$214 05	
Stereopticon and reporting	100 00	97 60	
Printing and postage (net)	400 00	303 53	
Social activities (net)	325 00	399 39	
Annual meeting, 1929	175 00	181 24	
Total	—————	1,220 00	1,195 81
<i>Journal:</i>			
Editor's salary and expense	\$500 00	\$470 00	
Printing and postage	3,100 00	3,539 64	
Reprints (net)	100 00	69 52	
Total	—————	3,700 00	4,079 16
Sections		300 00	181 26
Dues to Engineering Societies of Boston		4,535 00	4,535 00
Total		—————	—————
		\$11,155 00	\$11,210 67

REPORT OF AUDITING COMMITTEE FOR YEAR 1929-30

BOSTON, March 15, 1930.

We have examined the records and accounts of the Secretary of the Boston Society of Civil Engineers and have satisfied ourselves that they are properly kept, and that the money received has been transferred to the Treasurer.

EDWARD H. CAMERON,
ARTHUR L. SHAW,

*Auditing Committee of the Directors of the
Boston Society of Civil Engineers.*

Report of the Editor

BOSTON, March 10, 1930.

To the Board of Government, Boston Society of Civil Engineers:

The Editor submits the following report for the calendar year 1929 (Volume XVI of the JOURNAL).

The first seven numbers of the JOURNAL for this year were issued under the direction of Mr. Waldo F. Pike, Editor since October, 1927. In September, due to the fact that his increased business demanded all of his time, he presented his resignation to the Board of Government, which accepted it with regret, and expressed its appreciation of the successful manner in which he had conducted the affairs of the JOURNAL for the past two years.

The Board of Government elected Everett N. Hutchins as Editor.

During the year 1929 there have been published sixteen papers and discussions, eighteen items "of general interest," and two memoirs of deceased members.

The ten issues of the JOURNAL contained 641 pages; an average of 1,572 copies of each issue were printed. The net cost was \$2,854.17, as compared with \$2,554.11 for the preceding year. Table 1 includes a comparison of costs for the JOURNAL from 1925 to 1929, inclusive. In Table 2 details of cost for Volume XVI of the JOURNAL for the calendar year 1929 are shown.

The December issue of each volume contains the Contents and Index for the year.

Respectfully submitted,

EVERETT N. HUTCHINS, *Editor.*

TABLE 1. — COMPARISON OF COSTS OF JOURNAL, 1925 TO 1929, INCLUSIVE

YEAR	Vol.	Number of Pages*	GROSS COST†		NET COST‡		Number of Cuts and Inserts
			Total	Per Page	Total	Per Page	
1925 . . .	XII	626	\$3,816 45	\$6 10	\$2,485 90	\$3 97	146
1926 . . .	XIII	606	4,045 13	6 68	2,652 71	4 38	132
1927 . . .	XIV	700	4,155 56	5 94	2,905 31	4 15	121
1928 . . .	XV	638	4,143 38	6 49	2,554 11	4 00	150
1929 . . .	XVI	641	4,525 79	7 06	2,854 17	4 45	116

* Includes Advertising Section and Annual Index.

† Gross cost including editing, printing, mailing and reprints.

‡ Net cost equals gross cost less amounts received for advertising, subscriptions and sale of JOURNALS.

TABLE 2. — 1929 JOURNAL, VOLUME XVI

MONTH	PAGES		CUTS	COST					
	Papers and Proceedings	Advertising		Composition and Printing	Cuts	Reprints	Wrapping, Mailing and Postage	Editing and Expense	Copy-right
January	60	14	8	\$278 56	\$36 50	—			
February	41	14	4	208 34	10 82	\$36 55			
March	37	14	6	212 01	14 68	19 35			
April	97	14	0	457 82	—	93 92			
May	88	14	28	379 83	134 80	320 31			
June	53	14	13	254 26	40 77	—			
September	42	14	15	224 58	72 56	—			
October	33	14	15	187 21	72 21	30 06			
November	35	14	3	184 55	17 72	—			
December	79	14	24	335 07	119 92	—			
Total	565*	140†	116	\$2,722 23	\$519 98	\$500 19	\$289 19	\$474 20	\$20 00

* Includes 12 pages of Annual Index.

+ Includes Advertisers' Index and any other unpaid space.

Gross Cost of JOURNAL	.	.	.	.	\$4,525 79
Receipts from subscriptions, sales of JOURNALS and reprints	.	.	.	.	\$579 62
Receipts from advertising (net)	.	.	.	.	1,092 00
					1,671 62
Net Cost of JOURNAL	.	.	.	.	\$2,854 17

Report of the Library Committee, 1929-30

BOSTON, March 19, 1930.

To the Boston Society of Civil Engineers:

The Chairman submits, for the Library Committee, the following report for the year 1929-30:

During the year 325 books have been loaned to members of the Society, or to members of other societies included in the Engineering Societies of Boston; and fines amounting to \$17.75 have been collected.

The following books have been contributed to the Library: "Arithmetic of Sewage Treatment Works," Gordon M. Fair; "Sewerage and Sewage Disposal," Metcalf & Eddy; "Concrete Highways," Portland Cement Association; Handbook of "Reinforced Concrete Building Design," American Concrete Institute; "Transmission Towers," American Bridge Company.

A complete list of books added since the last report is appended. Among the books purchased this year were new editions of a number of standard texts in the civil engineering field. A section on "Building Codes" was established a few years ago, and considerable care is taken to keep these publications up to date.

The first problem presented to the Library Committee was the overcrowded condition of the shelves in the reference library. This was the more critical, due to the desire of the Board of Government to have this remedied prior to the fall meeting of the American Society of Civil Engineers. With the assistance of the entire Library Committee a survey and chart of shelf conditions, with recommendations to the Board of Government as to disposal of certain inactive periodicals, were made. With the approval of the Board these were temporarily taken from the shelves and are now awaiting final disposition, so that there is now room for reasonable expansion for all the current bound periodicals in the reference room. The list of books removed has been sent to the membership for suggestions as to the disposal of the same.

In order that the Board of Government should have definite information as to the space necessary for the accommodation of the Library if new quarters should be obtained, the Committee made a survey of the total shelf space now in use for all purposes, with an estimate as to what reduction in present facilities might be possible. The Committee recommended that in general the present facilities should be maintained, but believed that in the stack room a careful examination would probably disclose that approximately 33 per cent of the shelf space is being occupied by books of very doubtful value to the Society and which could probably be discarded.

The Committee was also asked to assist in receiving a portion of the library of Clemens Herschel. This has required considerable correspondence with Mr. Herschel's son-in-law, Mr. Hobart Rawsen.

The Chairman went to New York and assisted Mr. Rawsen in selecting the books, which were to come to this library. The balance of the Clemens Herschel Library has been given to the Boston Public Library. Mr. Herschel has been a most loyal friend to the Boston Society of Civil Engineers, and the Committee wish to make mention of the high character of his service to the Society which has continued over many years. His recent death is regretted by many friends in this Society.

Respectfully submitted,

HENRY B. ALVORD,
Chairman, Library Committee.

BOOKS ADDED TO THE LIBRARY, 1929-30

Concrete Highways. Portland Cement Association.
Handbook of Reinforced Concrete Building Design. American Concrete Institute.
Arithmetic of Sewage Treatment Works. Gordon M. Fair.
Highway Curves. Howard Chapin Ives.
Sky High. Eric Hodgins and F. Alexander Magoun.
Timber Design and Construction. Jacoby and Davis.
Engineering for Masonry Dams. Creager. (2d ed.)
Building Construction. Huntington.
Design of Masonry Structures and Foundations. Williams.
Water Supply Engineering. Babbitt & Doland.
Human Nature and Management. Tead.
Basic Principles of Concrete Making. Schmitt.
Structural Problems. Young.
Transmission Towers. American Bridge Company.
Sewerage and Sewage Disposal. Metcalf & Eddy.

Report of Committee on Social Activities

BOSTON, March 19, 1930.

To the Boston Society of Civil Engineers:

The Committee on Social Activities submits the following report for the year 1929-30.

At seven meetings during the past year the Committee has served approximately 880 members and guests of the Society with buffet suppers, an average of 125 per meeting. At the February meeting, when the Society was host to the Student Engineering Societies of Northeastern University, Massachusetts Institute of Technology, Tufts College and Harvard University, 270 members and guests were provided with buffet suppers. The smallest number served at any meeting was 70 members and guests.

Owing to the fact that most of the committee members are the same ones who served last year, the work of serving these buffet suppers has become a mere matter of routine. At the meeting with the Student Societies noted above, two members from each society were temporarily added to our ranks, thus affording added efficiency in serving the large number present.

The June meeting, which was a joint meeting with the New England Water Works Association, was held at the New Ocean House at Swampscott. A program of sports and contests, including a ball game in the morning and various events after the dinner, was enjoyed by a great many.

There was no meeting in October on account of the fall meeting of the American Society of Civil Engineers being held in Boston.

At this evening's smoker we hope to give the members of the Society a bit of relaxation and fun before starting the new fiscal year. The program, which we trust will be both entertaining and amusing, consists of feature acts from this year's Tech show, "Snobberies of 1930," a special broadcast "f-A-m-o-u-s and d-A-n-d-y," and

a presentation of "Various Uses of Inflammable Oils," illustrated with demonstrations by Past President Charles M. Allen.

Following the precedent adopted last year, the charge this year for buffet suppers to members has been thirty-five cents, and to guests, fifty cents. A considerable burden on the treasury is still felt in spite of the added income over two years ago, when the charge to guests was the same as to members. It may therefore prove necessary to increase the charge to members to further offset this burden.

The committee wishes to acknowledge the assistance of the Secretary in selecting the menus for the buffet suppers and arranging details.

George A. Haskins served as chairman until his resignation during the summer, when the present chairman was appointed.

Respectfully submitted,

RICHARD W. SHERMAN, *Chairman.*

Report of the Committee on Subsoils of Boston

BOSTON, March 19, 1930.

To the Boston Society of Civil Engineers:

Your Committee wishes to report progress in collecting reports of soil borings and data revealed by open excavation, together with ground water conditions.

The present method of the Committee regarding soil borings is to make copies of boring reports, made by the various companies doing that work, and to place these reports on file in the rooms of the Society.

In order to make it easy for the investigator to find the location of these borings, maps have been made showing the locations by placing a small distinctive circle at the place where the borings have been made.

These locations are numbered on the maps, and the corresponding number is placed upon the card on file in the rooms of the Society.

There are five maps, including the one for Cambridge, having approximately 918 boring locations shown upon them. These 918 locations represent about 3,765 borings, the details of which can be seen by referring to the cards on file.

These maps are revised from time to time as the accumulation of borings seems to warrant the work.

Another cross section numbered 3 has been added to the two now exhibited in the rooms. This section has been taken from Nashua Street through Beacon Hill, across the Common, through the South End to South Bay.

Until such a time as the maps and sections are published in the JOURNAL, your Committee suggests that members wishing to refer to the borings and sections with greater ease should provide themselves with blue-print copies of the maps and sections. These blue copies can be obtained from the Committee at cost.

The publication of these maps and sections, we hope, will take place some time during the coming year.

Our investigations have shown that the water levels in the Back Bay section of the city have been seriously lowered by pumping.

This has caused the wood piles under many buildings to rot and allow settlements, notably the Public Library.

It appears unsafe now to use wood piles above grade +3.

It is understood that the piles under the Public Library are being cut off at +1, but this is a special case, and if wood piles are cut off at +3 for this section of Back Bay, it is quite likely to be safe.

Deep basements having defective or disrupted waterproofing, and requiring considerable pumping to keep them dry, are largely responsible for this low condition of the ground water, and such basements are increasing in number.

The subway acts as a dam to the water from the Charles River, and this also has pumps, which are working a good share of the time.

This has a strong tendency to reduce the water level in its vicinity.

HARRY E. SAWTELL, *Chairman.*

Final Report of Committee on Floods

BOSTON, MASS., March 19, 1930.

To the Boston Society of Civil Engineers:

The Flood Committee of the Boston Society of Civil Engineers, appointed by President Marston soon after the flood of November 3 to 6, 1927, made progress reports to the Society at their annual meetings in March of 1928 and 1929, and now offer for your consideration the final report, which the Committee hopes will be of sufficient value to print as the report of the Society. The report is not as yet complete with photographs, diagrams and maps in their final shape, but these will be supplied well in advance of printing the report.

In the progress report of March 21, 1928, were given the names of the members of the committee as constituted at that time; by March 20, 1929, the names of Prof. A. C. Lyon of Orono, Maine, and Prof. J. W. Goldthwait of Hanover, New Hampshire, had been added.

While twelve of the twenty-six members of the Committee give Boston or Massachusetts as their address, four were appointed from Maine, three from New Hampshire, three from Vermont, two from Rhode Island, and two from Connecticut; and most of the Massachusetts members had business connections with problems in the flooded areas. The attendance at meetings has been particularly gratifying, those coming from a distance having been quite as regular as those living in the metropolitan district.

The 1928 progress report gave in detail the topics studied by the Committee in connection with the make-up of the report, most of which were taken up, and, if not actually included, were at least considered.

The main Committee has held seven meetings; the Program Committee has held eighteen meetings; and, in addition, much time was given to the preliminary reading carried on by correspondence.

The material contributed for this report was early divided as evenly as possible among the members of the Committee, in accordance with their particular knowledge of the subjects, and the subject matter contributed reflects their keen interest in their contributions.

The work of collecting this material and boiling it down to cut out surplus material and avoid duplication has been done by the subcommittee, consisting of Prof. H. K.

Barrows, Chairman, S. Stanley Kent, Secretary, and Messrs. H. B. Kinnison, Howard M. Turner and Dana M. Wood. Without the painstaking work and revision of the subcommittee this report would have reflected too much the efforts of a few members, with much surplus material left in and some important matter left out of this final draft.

The Committee's progress report of 1929 lists papers and reports on this flood, or some features of the storm, made by members of this Committee and others to societies, public service companies or clients; and very recently there has been published by the United States government, "Water Supply Paper, No. 636-C," prepared by H. B. Kinnison, a member of the Committee. All of these papers have been available to the Committee, and together with this report make up the material available for future studies of this and previous floods of New England rivers.

No attempt will be made in this statement of the Chairman to summarize the report. This is given in Chapter I of the report.

Perhaps it may be worth while, however, to mention some of the reactions from this November, 1927, flood as they have already appeared.

The destruction of mill property on the flood rivers, even to the washing out of mill yards, flooding of pumps, oil tanks, and chemicals affected by water, have brought new problems to the insurance engineers.

Public service companies on the Connecticut and Merrimack Rivers have already made permanent some of the temporary protection by sand bags and other barriers thrown up against this flood.

By chapter 28 of the Resolves of 1928 and chapter 36 of the Resolves of 1929, the Massachusetts Legislature passed legislation instructing the Department of Public Works to study the matter of protecting cities and towns on the Connecticut and Hoosac Rivers from flood damage. These reports have already been filed.

Many state and local highways in New Hampshire and Vermont washed out by this flood have been rebuilt as new roads of a very permanent character.

Bridges carried away or damaged by the flood have been rebuilt of steel and concrete.

Railroads which were out of commission for days, and in a few cases for weeks, have come out of the destruction with repairs to roadbeds, better protected, and with more permanent bridges and culverts than before the flood.

County and other commissions having in charge the design and safety of dams and embankments have examined the structures under their jurisdiction, and in many cases ordered changes and repairs.

Flood committees and engineers of public service companies, appointed to study the effect of this flood and possible remedies for the future in northern New York, Vermont, and Maine, for the most part have recommended reservoirs on tributary streams, or overlarge mill ponds on main streams, to serve to some extent the double purpose of power storage and flood control; but all recognize the difficulties in the way of this double service.

A recent meeting of delegates from fourteen states in the West and South adjourned without doing anything, because flood control, river navigation, electric power and irrigation "do not mix well. Some want levees, some reservoirs, some irrigation, some power."

Through the efforts of the Committee and others, additional rain gages have been established in New England, and snow on the ground and heavy precipitation on the higher altitudes are better understood than before.

For the present, at least, the newspapers show a keener interest in rates of precipitation and flow of streams, and this may result in a better knowledge of the conditions which make for floods.

France has just been through spring floods from the Garonne River and tributaries which have cost 500 lives and perhaps \$40,000,000 of property, — five times as many lives and as much property loss as all New England by the 1927 flood; and this in a country centuries old and with as many flood records as centuries.

Swanton, Vermont, appears to have an almost annual threat of floods from ice jams between the village and Lake Champlain, and if this is chronic some remedy should be worked out.

After all, the great question is what to expect for the future, and how much each flood adds to our knowledge of their coming and effect. Already this 1927 flood in one lawsuit has been classed as an act of God, and yet these floods continue to happen, and the factors, — snow, warm temperatures, heavy precipitation, insufficient channels, — which together make up the conditions which produce these floods, exist all the time. Whether this 1927 flood is one of a century or one of five hundred years is important to know; whether again it will find communities unprepared is perhaps more important.

The Committee is not partial to one remedy against floods, but believes that it should always be the subject of special study for each river and locality. All remedies look more attractive at first than when cost and betterments are figured out, but as a result of this 1927 flood, either co-operative plans to store flood waters should be carried out by state, local and public service officials, or sums of money laid aside as insurance for the time when recurring flood losses will be too great to be tolerated.

The public service companies, on account of their growing and tremendous investment in these rivers, are probably in a better position to keep records, sound warnings, and finance the storage reservoirs than the public generally; but the latter should contribute directly.

In closing, the Chairman wishes to urge on the younger members of the Society the hope that committee work will be kept up by the Society because of the value of the results and pleasure which such associations bring to the individual members.

Respectfully submitted,

ARTHUR T. SAFFORD, *Chairman.*

Report of the Executive Committee of the Sanitary Section

BOSTON, March 10, 1930.

To the Sanitary Section, Boston Society of Civil Engineers:

Following is a list of Meetings held during 1929-30, with a brief description of each:

March 6, 1929. — Annual meeting. "Some Examples of Pollution of Streams by Industrial Wastes," by Robert Spurr Weston, of Weston & Sampson; *attendance*, 32.

June 5, 1929. — Regular meeting. No paper presented; *attendance*, 3.

October 2, 1929. — Regular meeting. "Some of the Sanitary Menaces of Recreation," by Dr. George H. Bigelow, Massachusetts Commissioner of Public Health; *attendance*, 25.

November 6, 1929. — Special meeting. "The Effect of Industrial Wastes on Sewage Disposal Plants, with Especial Reference to Fostoria, Ohio," by E. Sherman Chase, of Metcalf & Eddy; *attendance, 27.*

December 4, 1929. — Regular meeting. Scheduled paper, "The Design of the Sewage Pumping Station at Wellesley, Mass.," by Prof. Charles E. Fuller, of Massachusetts Institute of Technology. Illness of Professor Fuller prevented his appearance, and in his place Mr. Francis H. Kingsbury, Assistant Engineer of the Massachusetts Department of Public Health, and Secretary of the commission investigating the sanitary condition of Boston Harbor, spoke on the "Sewerage of Metropolitan Boston;" *attendance, 23.*

February 5, 1930. — Special meeting. "Italian Marshes, Bavarian Fish Ponds, Rhenish Rivers, and Dutch Canals — Impressions of an Itinerant Sanitary Engineer," by Prof. Gordon M. Fair, of the Engineering School, Harvard University, with discussion by H. P. Eddy, Jr., of Metcalf & Eddy; *attendance, 32.*

Attendance. — Attendance at meetings has varied from 23 to 32, averaging 28, exclusive of the June meeting, at which no paper was presented.

The meetings have been preceded by informal dinners, at which the attendance has varied from 15 to 22, averaging 17.

Excursion. — The annual excursion was dispensed with in 1929, there being no new sanitary project of sufficient attraction, in the opinion of the Executive Committee.

Membership. — The present membership of this Section is 197, a loss of 4 over last year.

Seven new members were added, while 11 were lost, — 5 by forfeiture of membership, 1 by resignation, and 5 by death.

The five members who have been lost to the Section through death are as follows: Henry F. Bryant, J. E. L. Monaghan, H. F. Pierce, Hector J. Hughes, W. E. McClintock.

Executive Committee. — Meetings of the Executive Committee have preceded every meeting of the section.

Respectfully submitted,

For the Executive Committee,

G. G. BOGREN, *Clerk.*

Report of the Executive Committee of the Designers Section

BOSTON, March 10, 1930.

To the Designers Section, Boston Society of Civil Engineers:

During the past year seven regular meetings of the Section have been held. Brief summaries of these meetings follow:

March 13, 1929. — *Subject*, "The 1928 Joint Standard Building Code of the American Concrete Institute;" *speakers*, Prof. Dean Peabody, Jr., and Prof. C. Hale Sutherland, of Massachusetts Institute of Technology; Mr. C. E. Nichols, Engineer, Stone & Webster, Inc., Boston; Prof. Walter C. Voss, of Massachusetts Institute of Technology; Mr. R. R. Zipprodt, Portland Cement Association; *attendance, 190.*

April 10, 1929. — *Subject*, "The Design of the Ware River Shaft, Wachusett-Coldbrook Tunnel;" *speaker*, Mr. Clarence R. Day, Assistant Engineer of the Metropolitan District Water Supply Commission; *attendance, 30.*

June 19, 1929. — *Subject*, "Recent Experiments with Earth Pressure on Retaining Walls;" *speaker*, Dr. Charles C. Terzaghi, of Massachusetts Institute of Technology; *attendance, 75.*

November 13, 1929. — *Subject*, "Structural Problems in Airplane Design;" *speaker*, Prof. Joseph S. Newell, of Massachusetts Institute of Technology; *attendance*, 17.

December 11, 1929. — *Subject*, "The Protection of Exposed Concrete Surfaces;" *speaker*, Mr. Angus B. MacMillan, Chief Engineer of the Aberthaw Company; *attendance*, 42.

January 8, 1930. — *Subject*, "Practical and Impractical in Steel Design;" *speaker*, Mr. John C. Moses, Chief Engineer of the Boston Bridge Works, Inc.; *attendance*, 74.

February 5, 1930. — *Subject*, "Ready Mixed Concrete;" *speaker*, Mr. Miles N. Clair, Vice-President of the Thompson & Lichtner Company; *attendance*, 29.

The average length of the meetings was one hour and thirty-three minutes. The average attendance was 65.3. Last year it was 58.7. During the year one new member was added, one was reinstated, eleven were dropped, and one resigned. The net membership this year is 170; last year it was 180.

Respectfully submitted,

For the Executive Committee,

NORMAN P. RANDLETT, *Clerk*.

Report of the Executive Committee of the Highway Section

BOSTON, March 10, 1930.

To the Highway Section, Boston Society of Civil Engineers:

During the past year three regular meetings of the Highway Section have been held. These meetings are summarized as follows:

February 27, 1929. — Annual meeting. Election of officers as follows: Chairman, Prof. Charles B. Breed; Vice-Chairman, James E. Lawrence; Clerk, Ernest Mathers; Executive Committee, LeRoy M. Hersum, Prof. James W. Ingalls, Edwin H. Rogers. *Speaker*, Mr. Howard C. Holden, District Engineer of Massachusetts Department of Public Works; *Subject*, "The Hot Mix Type of Highway Surfacing;" *attendance*, 39.

October 16, 1929. — Highway Inspection Trip, which included Soldiers Field Road in Allston and Alewife Brook Parkway in Cambridge and Somerville; *attendance*, 15.

November 20, 1929. — Joint meeting with Boston Society of Civil Engineers. *Speaker*, Mr. Arthur W. Dean, Chief Engineer of Massachusetts Department of Public Works; *Subject*, "Massachusetts Highways;" *attendance*, 220.

During the year the Executive Committee has held two meetings.

Membership. — A circular letter sent to a selected list of members of the Boston Society of Civil Engineers by the Executive Committee resulted in a considerable increase in membership. The present membership in the Highway Section is 93; during the year there have been 29 new members enrolled. One member was reinstated, three forfeited membership, one resigned, and one has died, namely, William F. Williams. There has been a net gain in membership of 25 for the year, an increase of 37 per cent.

Attendance. — The attendance at meetings during the year has ranged from 15 to 220, and has averaged 91 per meeting.

Respectfully submitted,

For the Executive Committee,

ERNEST MATHERS, *Clerk*.

Report of the Executive Committee of the Northeastern University Section

MARCH 10, 1930.

To the Northeastern University Section, Boston Society of Civil Engineers:

The Northeastern University Section of Boston Society of Civil Engineers has held four meetings during the year, with an average attendance of 25.

April 12, 1929. — Annual meeting. *Subject*, "Engineering Problems, Metropolitan District Commission," by Edwin H. Rogers, Chief Engineer of the Parks Division, Metropolitan District Commission.

October 3, 1929. — *Subject*, "Boston Rapid Transit Development," by William W. Lewis, Assistant Engineer of the transit department, city of Boston.

November 12, 1929. — *Subject*, "Construction of the Cascade Tunnel," by Prof. Henry B. Alvord, head of the Civil Engineering Department of Northeastern University.

February 28, 1930. — *Subject*, "Wood Preservatives," by Mr. Harry E. Sawtell, Structural Engineer for Charles T. Main Co., Inc.

VERNON L. STONE, *Acting Clerk*.

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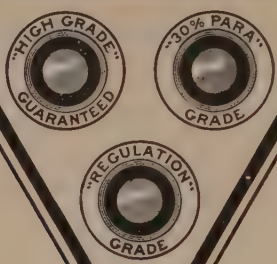
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